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PART I.*

WE know that several races have arisen on the earth, have attained a more or less complex civilisation, have perished, and are now lost in the abysmal depths of geological time. The Neanderthal man is supposed to have lived about 60,000 years ago. It has been inferred from a study of his skull that his intellectual capacity was at least considerable. Of his life and work and the manner of his death we know nothing: the words of the Preacher [1] being literally true.

"The thing that hath been, it is that which shall be: and that which is done, is that which shall be done; and there is no new thing under the Sun."

"Is there anything whereof it may be said, See, this is new? It hath been already of old time which was before us."

"There is no remembrance of former things; neither shall there be any remembrance of things that are to come with those that shall come after."

A record of the science of astronomy and of the formulæ of mathematics may long remain on tablets of stone; but I cannot imagine how the living processes of disease, and the clinical, chemical, bacteriological, and microscopical investigations, which have thrown so much light during the last 50 years on the abstruse problems of injury and disease, can be permanently recorded by any means we at present possess. Nothing has come down to us of the records of the past races of historical time which suggests that they possessed scientific instruments of precision or means of intercommunication such as we now have.

We can hardly credit or in any way appreciate the loss of our present complex surgical knowledge; but I may ask the question: What would become of our present-day civilisation, and of our medical and surgical knowledge, if the Himalayas, the Alps, the Pyrenees, the Rocky Mountains, and the Andes were to sink into the depths of the sea, and the Atlantic and Pacific Oceans were to become dry land? Look forward 10,000 years, and I ask what record would then be available of our present knowledge of the intimate pathology of disease and of the marvellous triumphs of surgery of our own day? Another question arises: Does the Neanderthal skull belong to a member of a race of men destroyed by some geological catastrophe, a race of which all news has been lost? In discussing the surgical knowledge of the ancients, I am anxious to guard myself against undue assumption of their ignorance or of their accomplishments. So slight is our knowledge of the lives and actions of surgeons of the olden times that we are apt perhaps to allot to them less than their due for the successful warfare which they waged against disease and death.

"The difficulty of real knowledge of ancient things lies largely in the accident of our remoteness. We stand very far off, and have to strain our eyes. For us the comparison of ancient and modern is largely a comparison of something half seen at a distance with something which we know intimately . . . . we see only the bold outlines, we are apt to miss the little lights and shades . . . . we have not the knowledge or the sympathy to catch, across the gulf of years, the peculiar thrill of what was once a 'winged word' flying from soul to soul."[2]

* Part II. will be published in our next issue.

[1] Ecclesiastes, i., 9, 10, 11.

THE DAWN OF SURGERY.

Surgery is the oldest branch of the healing art, for injuries must have been common events in the life of our remote ancestors. As a tribe evolved into a nation some empirical knowledge of the effects of injuries and some skill in their treatment must have arisen, to be handed down by tradition to succeeding generations. No written record of this early tribal surgery has reached us, but the evidence of ancient skulls shows that trephining was practised in prehistoric times. The object of these early craniectomies can only be conjectured. Broca argued that they had a fanciful, ritual, or religious object, and was rather unwilling to believe that they were undertaken as therapeutic measures. Victor Horsley,[3] after careful examination of the skulls in the Broca Museum at Paris in 1887, came to the following conclusions: (1) That the operative openings were nearly always to be found over the site of the representation of movement on the cerebral cortex; (2) that the patients had probably been suffering from Jacksonian epilepsy; (3) that the operation would gain a certain reputation for the cure of convulsions generally: and (4) that at least some of the operations—e.g., for depressed fracture—would result in cure.

The late Prof. Lucas-Championnière,[4] who made a profound study of the subject in a work published in 1912, gives an account of skulls bearing on the question, collected principally from the burying-grounds of the Incas of Peru, a nation of whose history nothing is known, and from caves and tumuli in various parts of France—some belonging to the Stone Age, others attributed to nations of ancient Gaul of a date not long before the dawn of Roman history. The number of skulls showing evidences of the operation which have been found is sufficient to prove that it must have been frequently performed, and the evidence of survival for a long period is in many instances quite clear.

Analogies with Surgery of Half-civilised Races of the Present Day.

Lucas-Championnière also investigated the operation as still practised by itinerant operators among certain half-civilised tribes, such as the Kabyles of the hinterland of Algeria, and showed that it presents many analogies with that of prehistoric times. He concludes that prehistoric trephining was undertaken as a *remedial* measure.

"Not only," said he, "do our recent therapeutic views justify the cranial therapy of the neolithic savage, but the observation of modern savages is well calculated to make us interpret in this way the operations of primitive man. These openings must have been made in order to treat diseases which seemed to lie within the cranial cavity; those of which the chief symptom was pain referred to the interior of the head. The trephinings were done to treat pain in the head which other measures did not succeed in alleviating. Considerable relief to pressure must have been afforded by the opening in the skull, and this must have been all the greater as the openings were often of large dimensions. In short, a decompressive operation was done which we have only quite recently learned to do, and the value of which, even now, but few doctors appreciate."[5]

Lucas-Championnière also states that at the present day the operation is carried out amongst the Kabyles, the Montenegrins, and perhaps other peoples, as it was done in the Neolithic age; and that it may still

[2] Gilbert Murray: The Rise of the Greek Epic, 1912, p. 27.

[3] Journal of Anthropological Institute, 1888.

[4] Les origines de la trépanation décompressive.

[5] Lucas-Championnière seems to have forgotten that a decompressive operation, limited to the removal of a portion of the skull and without incision of the dura mater, is ineffective. The dura is a very strong white fibrous inelastic membrane. Prof. Sherrington and I did a few experiments many years ago in order to determine how much more fluid would enter the intradural cavity after the removal of considerable portions of the cranium. The quantity of such fluid was extremely small, almost negligible; and corresponded only to the unfolding of the dura when free of the eminences and depressions on the inner surface of the skull.

be studied in its original form unaffected by contact with the greater knowledge and altered practice of the civilised nations of Europe. In this country only two skulls have been found which illustrate primitive[6] trephining. In the island of Malta, which abounds in Neolithic remains, Prof. Zamit informs me that no skull has been found showing evidence of this operation—perhaps because few whole skeletons have been found, although great numbers of disarticulated human bones have been discovered.

During my visit to Egypt last winter Dr. Reisner, the American Egyptologist, told me that in the 20 years he had worked in Egypt he had not come across a trephined skull.

Mr. Colledge informs me that during a recent visit to Seville he saw in the museum a skeleton which had been removed from a Roman tomb. The left parietal bone showed a large healed opening evidently caused by a trephining operation. A most interesting account of trephining as at present practised in Algeria by the Shawia surgeons of the Aures massive has recently been published.[7] The trepanning was usually done for fractures of the skull. The instruments and drugs employed rather indicate that they entered the country in the wake of the Muhammedan conquest, or it may be that the operation was introduced during the Roman occupation. It is indeed of surprising interest to note that thousands of years before trephining was deliberately employed for the treatment of organic disease of the brain a *decompressive craniectomy* was performed in many parts of the world as a therapeutic measure for pain in the head, for fits, for insanity (the Biblical disease "possessed of the devil"), and for fracture of the skull.

MESOPOTAMIA.

Mesopotamia is the site of the Scriptural account of the origin of man, and has been described as "the nursery, if not the cradle of all culture,"[8] Babylon "the glory of the nations, the beauty of the Chaldees excellency," and Nineveh, the "divinely great city" of "three days' journey," represent a phase, not the beginning of intellectual development. We know little of the surgery of these ancient nations, though the mention of certain fees for surgical operations (and penalties too) on deciphered Babylonian tablets seems to show that it was extensively practised.[9] The earliest mention of Babylon is in an inscription on a tablet ascribed to a date about 3800 B.C. The city suffered many vicissitudes, and in the year 689 B.C. was utterly destroyed by Sennacherib. It was gradually rebuilt, and in the reign of Nebuchadnezzar covered an area of more than 100 square miles. The wall surrounding it was in length about 50 miles, being 300 feet high and 85 feet broad, so that a four-horse chariot could turn on the top of it. The water-supply of Babylon was from a reservoir 40 square miles in extent; the houses of the city were three or four storeys in height. It is scarcely conceivable that a city of magnificent buildings, with a record dating back 3000 years, should not have surgeons—men famous in the treatment of wounds and diseases.

EGYPT.

Of the surgery of the Ancient Egyptians little is known, but there is good reason to infer that they performed many operations and were expert in the treatment of wounds and fractures.

"The Kingdom of the Pharaohs has left deeper traces upon the memory of mankind than that of Babylon. The culture of the valley of the Nile remains vivid on account of its intimate association with the civilisation of the Mediterranean nations. For thousands of years the majestic pyramids have kept fresh in the minds of countless races the golden age of the land of their birth."[10]

Homer praises the high position of medicine in Egypt, saying of that country—

> "Whose prolific Nile
> With various simples clothes the fatten'd Soil,
> From Pœon sprung, their Patron-God imparts
> To all the Pharian race his healing Arts."[11]

Heredotus declared Egypt to be the healthiest of countries. Notwithstanding the fine climate of Egypt, he says that the physicians were very numerous and were all specialists. What a happy family they must have been! There was considerable intercourse, by no means always of a peaceful nature, between the Jews of Biblical time and the Egyptians, some of the remedies mentioned in the Scriptures may have come from the Egyptian materia medica. During my visit to Egypt last winter I learned that poultices of figs, the remedy prescribed for King Hezekiah (who began to reign in 717 B.C.), are still in common use in Egypt and Palestine. Again, in Proverbs[12] we read, "The blueness of a wound cleanseth away evil, so do stripes the inward parts of the belly." Dr. Ali Bey Ibrahim told me that the people of Egypt commonly employed the method of congestion in the treatment of unhealthy wounds of the extremities by placing ligatures of various materials around the limb above the wound. Bier's congestion method has probably been practised in Egypt for thousands of years. Another friend, Dr. Gorgi Sobby, examined for me the oldest manuscript of the Proverbs, which is in Cairo. He found that the word translated "stripes" in the Authorised Version might mean also the cautery. The cautery is in constant use at the present time in Egypt for the treatment of abdominal ailments. Scars on the abdominal wall from the application of the cautery are commonly seen in the Cairo hospital. In Ecclesiasticus[13] the word Rôphê is translated in our version "physician." It really means "healer," but as the first healers were surgeons I use the word "surgeon" in the following beautiful language of the son of Sirach (180 B.C.):—

1. Honour the surgeon according to thy need of him
   with the honours due to him:
   For verily the Lord hath created him.
2. For from the Most High cometh healing:
   And from the King he shall receive a gift.
3. The skill of the surgeon shall lift up his head:
   And in the sight of great men he shall be admired.
6. And He gave men skill,
   That they might be glorified in His marvellous works.

GREECE.

Greek surgery is the earliest of which we have any definite record. The operation of trephining in the time of Hippocrates seems to have been carried out in an admirable manner. The use of wine and honey[14] in the treatment of wounds and the application of dry dressings were conducive to the success of the operations. There is ample evidence that the Greeks, in common with the other peoples of the "orbis terrarum" of the Mediterranean, and with the Eastern nations, inherited a whole system of medicine, pharmacy, and surgery from a remote ancestry. In Grote's[15] time history began with the first Olympiad (776 B.C.). To-day the origins of Greek civilisation go back to at least 3800 B.C. Recent investigations go to show that Crete, a kind of half-way house between two continents, was probably the starting-point of European civilisation.

[6] Wilson Parry: Proc. R.S.M., Hist. Section, 1921.
[7] Captain Hilton-Simpson: "Among the Hill-folk of Algeria."
[8] Neuberger: History of Medicine, vol. i., p. 11.
[9] Neuberger: Ibid, p. 18, about 2200 B.C. certain regulations were enforced: (1) "If a surgeon causes a severe wound with a bronze knife and cures his patient, he shall have 10 shekels of silver. (2) "If a surgeon causes a severe wound and the patient dies he shall have his hands cut off."
[10] Neuberger: Ibid, p. 19.
[11] Odyssey: Bk. 4 L., 320–25 (Pope).
[12] Chap. xx., 30.
[13] Chap. xxxviii., Dr. Cowley, Bodleian Library (private letter), writes: "The word Rophe means a "Healer." In later times a distinction was made and a surgeon was called Uman, which means a manual worker. Prof. Myres writes that Uman recalls the Homeric grouping of skilled labourers—e.g., the line "wizard, healer of illnesses, or shaper of spears."
[14] Raw tar water, a crude kind of carbolic acid, was also used in the treatment of wounds. Berdoe's History of Medicine, p. 177.
[15] History of Greece, 1846.

Indeed, the Minoan culture (3400–2000 B.C.) goes back to Neolithic man: the excavations already made lie over Neolithic strata which are of a date at least 9000 B.C.[16] It is possible, I think, that the more perfect methods of trephining practised by the Hippocratic surgeons had a direct and continuous descent from the primitive operations of the Stone Age.

Dr. Wace,[17] director of the British School at Athens, has recently described the wonderful discoveries at Mycenæ. He says: "All research in this period (circa 1400 B.C.) helps us not only to write the earliest history of Greece, but to fill out, little by little, the background of Homer (900 B.C.). We now realise that Homer does not give us the first struggle of a rising Hellas, but the climax, or rather an epitome of the wonderful pre-Homeric Greece, of which even Athens in its prime knew little. Yet it was in the pre-Homeric days of the Bronze Age that the broad foundations of the glory of Greece were laid. Long before history proper, Mycenæ attained to a truly magnificent civilisation, far in advance of that which obtained in the centuries immediately following Homeric times. These centuries appear to have been a kind of dark age in Greece, an interval of mediævalism, standing between the time of the ancient splendour and the birth of the classical period. There thus appears to be a rhythm in human affairs, an alternation of efflorescence, decay, and efflorescence again." The Golden Age of Cretan civilisation dates back from about 2000 to 1400 B.C.; that of Mycenæ runs from about 1500 to 1300 B.C., and in both cases there was a long adolescent period further back still. We have no knowledge yet concerning the surgery of the Golden Age of Crete or of Mycenæ. Prof. Myres[18] suggests that "the reason is probably because no surgeon or surgical abode has been dug up yet. I found," he writes, "a curious votive clay figure at Petsofà, in Eastern Crete, showing the whole body bisected from the vertex downwards, as if to exhibit the organs inside." Is it possible that anatomy was in this way studied in those ancient times by means of frozen sections? It is certainly quite impossible to imagine the wonderful civilisations of Crete and of Mycenæ without surgeons.

Æsculapius.

At present the history of Greek surgery commences with the story of Æsculapius. Cheiron, the wise centaur, taught the art of healing to Æsculapius. Pindar[19] tells the story of his education.

> "On some the force of charmèd strains he tried,
> To some the medicated draught applied;
> Some limbs he placed the amulets around,
> Some from the trunk he cut, and made the patient sound."

Æsculapius became so proficient in the healing art that Pluto accused him of diminishing the number of the Shades, and thereupon Zeus destroyed him with a thunderbolt.

The story of Æsculapius has no doubt some facts for a basis. It dates from about 1250 B.C., and Æsculapius is described as a chieftain of Thessaly. He had two sons who became famous as army surgeons, and there was probably a continuous tradition of surgical knowledge from the time of Æsculapius to that of Hippocrates. Æsculapius was worshipped after his death as a divinity all over Greece; his temples, built for the most part on wooded mountain slopes near mineral springs, became popular sanatoria. The priests carried on the surgical tradition; temple cures were not uncommon. How did the priests produce anæsthesia—by draughts, by inhalation of narcotic drugs, or by hypnosis? A patient with an abscess in the abdomen is operated on; he is assured that all is a dream and departs cured, but the tell-tale comment appears, "And the floor of the abaton was covered with blood."[20]

[16] See Garrison, History of Medicine, 1917, second edition.
[17] Times Literary Supplement, Oct. 13th, 1921.
[18] Private letter.
[19] Pindar's Third Pythian Ode. Wheelwright's Translation.
[20] Dr. Charles Singer's Chapter on Greek Medicine in Livingstone's "Legacy of Greece."

Early Anæsthetics.

The artificial induction of painlessness by narcotic draughts was traditionally known in ancient times. The Chinese were acquainted with general anæsthesia thousands of years ago. It is related of the surgeon Hoatho in the third century A.D. that he performed amputation, trephining, and other major operations by its aid.[21] Dr. Browne[22] relates two cases of anæsthesia taken from a Persian manuscript. The first story concerns Aristotle and an Indian surgeon named Sarnab. An earwig had entered the patient's ear and attached itself to the brain. Aristotle gave the patient a drug so that he became unconscious while Sarnab trephined the skull. This was excellent treatment. It is now well known that living foreign bodies may produce otitis and meningitis. In the second case the operation was Cæsarean section, and wine was the agent which produced unconsciousness.

Homeric Surgery.

Homer lived about 900 B.C. Homeric surgery is naturally chiefly descriptive of the treatment of wounds · the clinical signs and symptoms of injuries—e.g., the signs and symptoms of wounds of the heart—are well described. Those of my audience who are fond of shooting may have seen a rabbit or a hare, when shot, spring into the air and spin round on its longitudinal axis before becoming motionless. In such a case a pellet would be found to have injured the cerebellum. In the Iliad, Book VIII., the horse of Nestor is wounded in the brain by an arrow shot from the bow of Paris. "In agony the horse sprang into the air as the missile passed into the brain. The team was thrown into confusion by the rolling of the wounded horse on the ground." I think it possible that the cerebellum of this horse was wounded. It is not stated whether Paris was behind or in front of the horse when the arrow sped from his bow. If he was in front the arrow probably pierced the weak spot in the middle line on the vertex of the skull where the mane commences. This is some inches behind a transverse line joining the two orbits. On examining an antero-posterior median section of the brain and skull of the horse it is seen that a dart or arrow, travelling by the side of the falx, might reach the cerebellum by this route. The cerebellum of the horse is large as compared to the cerebrum. If, on the other hand, the arrow entered behind the ear, thicker bone would have to be traversed before the cerebellum could be wounded.[23]

Arctinus of Lesbos (770 B.C.), a pupil of Homer, is the first Greek poet of whose personality[24] we are certain. He reveals a clear distinction between medicine and surgery.

> "Then Æsculapius bestowed the power of healing upon his two sons; on one did he bestow the lighter hand, that he might draw missiles from the flesh, and sew up and heal all wounds; but the other he endowed with great precision of mind; so as to understand what cannot be seen, and to heal seemingly incurable diseases."[25]

Hippocrates.

About four centuries after Homer Hippocrates lived and worked. He is believed to have been descended from Æsculapius, and through his mother from Hercules. It is certain that he was a member of the family of the Asclepiadæ, the pioneers of scientific medicine and surgery. The prophecy of Daniel,[26] "Many shall run to and fro, and knowledge shall be increased," was little more than 50 years old at the

[21] Neuberger, p. 72.
[22] FitzPatrick Lectures, 1921, p. 79.
[23] Prof. Myres writes: "Nestor's horse was struck by an arrow (line 81) shot by Paris upon the top of his crown (or Latin vertex) where the first hairs of a horse grow upon the cranium and a wound here is most mortal." The forelock of an English horse is trained downwards between the eyes but this was not done in ancient Greece. Greek horses have no forelock.
[24] Withington: "Medical History from the Earliest Times," 1894.
[25] Quoted from Berdoe's "Origin and Growth of the Healing Art."
[26] Daniel, xii., 4.

time of his birth. He lived in a great age, and had for contemporaries many distinguished men. Aristotle was of the next generation. This group of famous men have conferred immortal honour on the times in which they lived, and have exalted the dignity of human life and work. At this period, too, other regions of the earth were remarkable for moral and intellectual development, for Confucius, Gotama Buddha, and Zoroaster had lived only a few years before the Hippocratic era.

"It is the unique distinction of the Greeks among the nations of antiquity, that they practised a system of medicine based not on theory but on observation accumulated systematically as time went on. The claim can be made for the Greeks that some at least among them were deflected by no theory, were deceived by no theurgy, were hampered by no tradition in their search for the facts of disease, and in their attempts at interpreting its physical phenomena. . . . . The Hippocratic writers remain, for the most part, patient observers of fact, sceptical of the marvellous and the unverifiable, hesitating to theorise beyond the data, yet eager always to generalise from actual experience; calm, faithful, effective servants of the sick."[27]

Whatever personal contributions Hippocrates made to knowledge, and they were no doubt many and important, he took in all that had been done before, selected the valuable from the worthless, and gave to surgery an existence as a science independent of superstition and the sophistries of philosophers. The collection of writings known as the Hippocratic treatises (Corpus Hippocraticum), which happily survived the wreck of ancient literature, not only enables us to form a fairly accurate conception of the practice of surgery in that period, but is the foundation of medical literature, and held undisputed sway for several centuries. Hippocrates probably knew all that could be known by clinical observation without the aid of instruments of precision and without accurate knowledge of anatomy, physiology, and pathology. To what literature he may have had access we do not know, for pre-Hippocratic Greek medical writings have perished.

The superstitions entertained by the Greeks respecting their dead prevented, it has generally been thought, the Hippocratic surgeons from practising dissection, but perhaps they followed the plan of the Arabs:

"The celebrated Yuhanna being unable to obtain human subjects dissected apes in a special dissecting room which he built on the banks of the Tigris. A particular species of ape considered to resemble man most closely was by command of the Caliph supplied to him about the year A.D. 836 by the ruler of Nubia."[28]

Dr. Adams[29] says:

"It is certain that by some means or other Hippocrates dissected. The language of our author in this place (on dislocation of the shoulder) puts it beyond doubt that human dissection was practised in his age."

There is no doubt, in fact, that a great deal more human dissection went on than Greek doctors dared to acknowledge for fear of exciting popular prejudice. Less than 100 years after the death of Hippocrates there was abundant and open dissection of the human body in the schools of Alexandria.[30]

Of the man Hippocrates we know little; we speak of him as the father of medicine, and he is also the father of surgery.

"The glimpse that we have of Hippocrates is very dim and distant, yet we cannot exaggerate the influence on the course of medicine and the value for physicians of all time of the traditional picture that was early formed of him, and that may indeed well be formed again from the works bearing his name. In beauty and dignity that figure is beyond praise. Perhaps gaining in stateliness what he loses in clearness, Hippocrates will ever remain the type of the perfect physician. Learned, observant, humane, with a profound reverence for the claims of his patients, but with an over-mastering desire that his experience shall benefit others, orderly and calm, disturbed only by anxiety to record his knowledge for the use of his brother physicians, and for the relief of suffering, grave, thoughtful and reticent, pure of mind and master of his passions, there is no overdrawn picture of the Father of Medicine as he appeared to his contemporaries and successors. It is a figure of character and virtue which has had an ethical value to the medical men of all ages comparable only to the influence exerted on their followers by the founders of the great religions."[31]

Hippocrates has been described—

"as a shining example of philanthropy and professional faithfulness; a seeker after truth with full consciousness of its being unattainable. He overcame time and still exercises upon mankind a wonderful unbroken power by means of his temperate observations, his farseeing methods and his therapeutic principles, which derived from Nature, and opposing no progress, are themselves unsurpassed. He resembles a spring with many streams, vivifying and inexhaustible. Admired by all, understood by few, imitated by many, equalled by none, he was the master of medicine for all time."[32]

Examples of Hippocrates' Technical Knowledge.

Hippocrates' knowledge[33] of the varieties and clinical signs of injuries to the head seems to have been very complete, and his method of trephining the skull was not inferior to that practised at the present day. He employed a collar on the trephine to prevent it penetrating too deeply, a plan which has only recently been reintroduced. In some cases he recommended operation in order to "*slacken the tightness of the head*," in other words, to decompress in cases of inflammation, and to allow of the escape of blood or matter, and to remove foreign bodies. He was aware of the danger of infection of the bone from inflammation of the soft parts, and in those cases he recommended free incision of the scalp. He recognised that a blow on one side of the head sometimes was followed by convulsions or paralysis of the opposite side,[34] and in hernia cerebri he used drying applications and gentle pressure.

Hippocrates recommended the use of the trephine as a cure for blindness without evident disease of the eye, and may have seen and relieved cases of optic neuritis from intracranial disease. The passage is in the book "On Vision" (Littré's Translation, Vol. IX., p. 159):

"When sight fails without apparent disease of the eyes an incision should be made in the parietal region, the soft parts reflected, the bone trephined and the fluid beneath let out—that is the treatment, and it is thus these patients get well."

It would seem that Hippocrates must have opened the dura and obtained a flow of cerebro-spinal fluid. Decompression is not effectual without incision of the dura. Operation is also suggested in certain acute conditions, probably meningitis (Littré, Vol. VII., p. 29). The seed dropped by Hippocrates did not germinate in regard to the treatment of amaurosis without visible ocular disease, and in regard to meningitis till our own time some 30 years ago.

PERSIA: THE ALEXANDRIANS.

How far Greek medicine was a purely indigenous product or to what extent it was influenced by Eastern knowledge we do not know. The Greeks penetrated into Egypt and the East before the time of Hippocrates; but there were no international congresses in those days, and nations became acquainted principally by the method of invasion and conquest. The Greeks in the seventh century B.C. encountered the decline, not the zenith of Egyptian medicine; the highest development of the latter is to be referred to about 2000 B.C. With the break-up of the Roman Empire intellectual darkness fell on the Græco-Roman world, but the last sparks of Grecian knowledge were kept burning by the Persians. The story of Demokedes related by Grote[35] shows

[27] Charles Singer: Ibid.
[28] Dr. Browne: Arabian Medicine, p. 37.
[29] The Genuine Works of Hippocrates.
[30] See Berdoe's "Origin and Growth of the Healing Art," 1893, p. 174.
[31] Dr. Singer: Ibid.
[32] Neuberger: Ibid., p. 137.
[33] The Genuine Works of Hippocrates, by Francis Adams, 1849, vol. i.: Injuries of the Head, pp. 421–466.
[34] Epidemics, par. 35. (Littré, vol. v., p. 405).
[35] Vol. iv., p. 342.

that as early as the days of Darius (550 B.C.) the Persians were acquainted with Greek surgeons. The later knowledge of the Græco-Roman period came to them from the Nestorians expelled from Constantinople for heretical opinions in the fourth century A.D. The ruler of Persia hospitably received the exiles and caused the best Greek, Latin, and Indian works to be translated into Persian. The lasting service rendered by Persia was in giving a home to Greek medicine and surgery; the knowledge thus preserved was passed on to the all-conquering Arabs.

When Greece lost her intellectual supremacy, with her national independence, the centre of literature, philosophy, and science was shifted to Alexandria. This city was founded by Alexander in 331 B.C., and after his death it fell with the Egyptian portion of his empire to Ptolemy Soter (280 B.C.). Under this monarch the famous school was founded where anatomy was systematically studied by dissection and it is alleged also by human vivisection. Herophilus and Erasistratus were the great professors of Alexandria: they are many times mentioned by Celsus, and the name of Herophilus is immortalised in anatomical nomenclature; but the whole of the writings of the Alexandrian school are lost, except for a few fragments in the works of later authors. The Imperium Romanum is more noted for military science, civil engineering, and law than for the healing art. Greek surgeons were, however, of great repute in ancient Rome.

CELSUS.

After Hippocrates the next great period in the history of surgery is that of Celsus and Galen. Between Hippocrates and Galen, an interval of five centuries, flourished the great Alexandrian school. Our only important source of information concerning the surgery of the Alexandrian period is Celsus (30 B.C.), who lived in the reign of Tiberius. From Celsus we infer that the brilliant anatomy of Alexandria made for good practice in surgery and for advance in surgical diagnosis. He describes the operation of trephining and expresses the opinion that in some cases it must be done even when there is *no fracture of the skull*. "It sometimes," he says, "though rarely happens that the bone remains intact, and that owing to a rupture of a vessel of the dura mater blood is effused beneath the bone, and there coagulates and causes great pain and dimness of vision. Nearly always the pain is over the site of the clot, and here the bone should be trephined." [36]

GALEN.

Galen, like Celsus (A.D. 150), owed much to his knowledge of the Hippocratic writings and to the human anatomy which had been taught in the Alexandrian schools. He is the most voluminous of the ancient writers, but all his life he was engaged in research in anatomy, physiology, and surgery. He had a difficulty in obtaining subjects in Rome for dissection, and had to send his students to Germany to dissect the bodies of enemies slain in battle—just as Lord Lister had to go to Toulouse to perform certain experiments to escape being subject to the criminal law of England.

As far as we know, Galen was the first and only experimental physiologist before Harvey. He divided the nerves—e.g., he produced aphonia by cutting the recurrent laryngeal; he divided the spinal cord at different levels, and removed portions of the brain, so obtaining definite results concerning the cause and seat of various paralyses. Both Celsus and Galen used the ligature for the arrest of hæmorrhage and the cure of aneurysm; and Galen tells us he obtained both silk and catgut ligatures in a shop in the Via Sacra in Rome.

The natural outcome of the Alexandrian anatomical studies was the ligature of arteries for wounds and aneurysm. Is it conceivable that these great surgeons, Celsus and Galen, were wholly ignorant of the physiology of the vascular system? Is it not more likely that as Ambroise Paré rediscovered, in 1570, the use of the ligature, so Harvey, in 1618, redemonstrated to the modern world what had been understood, though perhaps only dimly, by Celsus and Galen? How could Celsus have written "Sanguinis cursus revocetur" without having some idea of a blood current? In another place Celsus advises tying vessels during an operation before dividing them. Why should he give this advice if he knew not that the blood coursed through the arteries?

The knowledge collected in the Alexandrian schools was in great part lost in the burning of the Alexandrian libraries,[37] in the burning of the royal library of Tripoli,[38] and in the wars and tumults of the early centuries after Christ. At first sight it is a matter of wonder that we know as much as we do of ancient times, for, as Dean Milman remarks, the whole state of the known world at that period seems to offer no more secure footing to an historical adventurer than the Chaos of Milton. From the date when the learning of Alexandria was lost till the rise of the famous sixteenth century school of anatomists a period of 1000 years passed by during which the spirit of man was content without anatomical or physiological inquiry.

THE ARABS.

It is essential in relation to the history of surgery to catch the character and spirit of the age from which the example is drawn. Such Greek surgical learning that survived the general wreck of knowledge was preserved by the Arabs, and in Europe in the monasteries. The wonderful conquests of the Arabs in the seventh century were followed by an intellectual activity hardly less wonderful. Dr. Browne, the professor of Arabic at Cambridge, in his FitzPatrick lectures has told a story of surpassing interest.

> "A Byzantine Emperor was astounded to find that the right of collecting Greek manuscripts was among the terms dictated by a victorious barbarian. The Muslims were the faithful transmitters of Greek surgery. It is doubtful whether they added anything to it. During the Golden Age of Arabian learning between A.D. 750 and 850 the Muhammedan Empire extended from Baghdad on the Euphrates to Andalusia in Spain, on the banks of the Guadalquiver. The Caliphs by purchase, conquest, and exchange possessed themselves of countless precious manuscripts which they caused to be translated. Of the books enumerated in the Index (A.D. 987) it is not an exaggeration to say that not one in 1000 now exists. The Mongols, 'that detestable nation of Satan,' poured forth like devils from Tartarus and did their work only too thoroughly."

The destruction of the Arabic collection of manuscripts in the Library of Wisdom at Baghdad (A.D. 1258) can only be likened to the burning of the libraries of Tripoli and Alexandria.

Mediæval European Medicine and Surgery.

In our own country and in the other European provinces of the Roman Empire such learning as survived was preserved in the monasteries; the learned order of Benedictines seems to hold the chief place in monastic medicine. Benedict, the Saint of Subiaco, founded the monastery of Monte Cassino in 542, and from this the medical school of Salerno is

[36] Book VIII., Chap. 4.

[37] Gibbon's Roman Empire: Notes by Dean Milman, 1887, vol. iii., note to p. 417. Apparently there were originally two libraries in Alexandria; one was destroyed by Julius Cæsar 47 B.C., and the other, called the Bruchium, is said to have been destroyed by the Emperor Aurelian in suppressing a revolt A.D. 273. If this is correct, "the library destroyed A.D. 640 in the royal palace and in the temple of Serapis no longer contained the 400,000 or the 700,000 volumes in MS. collected by the Ptolemies" (vol. vi., p. 337), but may have contained some MS. saved from the previous conflagrations and newly collected works.

[38] A.D. 1109. Gibbon, vol. vi., note to p. 338: "The library of Tripoli is said to have contained the incredible number of 3,000,000 of volumes. On the capture of the city, Count Bertram, of St. Gilles, entering the first room, which contained nothing but the Koran, ordered the whole to be burnt, as the works of the false prophet of Arabia."

said to have originated. The centuries which immediately followed the establishment of the school of Salerno, the connecting link between ancient and modern medicine, were barren. The labours of the faculty were chiefly sterile discussions of the ancient writers, and the elaboration of a, mostly useless, materia medica. The works of Paulus Ægineta were written probably about 100 years after the burning of the Alexandrian libraries, and give evidence of the decay of knowledge since the times of Celsus and Galen. They team with absurd and useless remedies. In the dark centuries that followed, surgery, in Europe at all events, came to be regarded as an occupation unworthy of a scholar and a gentleman. In the thirteenth, fourteenth, and fifteenth centuries the operation of trephining appears to have come again into vogue—Guy de Chauliac (1363), Paré (1561), Andrea a Cruce (1573), and many others published works with illustrations of operations crude and dreadful as compared with the Hippocratic method. Theodoric (1206–1298), a forerunner of Lord Lister, wrote against the doctrine that suppuration was necessary to the healing of a wound. "Such a practice is indeed to hinder Nature, to prolong the disease, and to prevent the conglutination and consolidation of the wound."[39] Another of the earliest writers in mediæval times to revive scientific surgery was Henri de Mondeville (1260–1320), who wrote that, if treated on Theodoric's and his own instructions, "every simple wound will heal without any notable quantity of pus. Many more surgeons know how to cause suppuration than how to heal a wound."[40] Surgery in general, and wound treatment in particular, seem to have retrogressed for two centuries or more after Mondeville's time. It was indeed 600 years before the sound doctrine of Theodoric and Henri de Mondeville became current practice.

THE REVIVAL OF ANATOMICAL KNOWLEDGE.

As wound surgery is the foundation of surgery, so the revival of surgery is first shown in the treatment of wounds. The evolution of surgery as we understand it to-day presents itself to our vision in several successive and necessary stages. It commences with the Renaissance of anatomy and the attainment of accurate anatomical knowledge, later combined with the study of gross morbid anatomy. The combination of a real insight into anatomy, normal and pathological, was soon followed by the rise and rule of the famous operating surgeons.

(To be concluded.)

[39] The first printed edition of Theodoric's work on Surgery appeared in 1498. This sentence is quoted from "Historical Relations of Medicine and Surgery," by Clifford Allbutt, 1905, p. 30.

[40] Quoted from Clifford Allbutt: Ibid., p. 43.

THE LATE DR. JAMES LAWRENCE.—On Dec. 9th last Dr. James Lawrence passed away at Westward Ho! North Devon, whither he had retired from Darlington rather more than two years ago. Born in 1844, near Portrush, and educated at the Coleraine Institution, Dr. Lawrence graduated at the Belfast and Dublin Universities and came to England shortly after taking his medical degrees. In 1872 he went as house surgeon to the Darlington Hospital, and in 1874 was appointed medical superintendent of the Infectious Diseases Hospital, becoming M.O.H. for the town in 1882. He recommended the building of the Darlington Fever Hospital on its present site, and worked hard and successfully to improve the sanitary conditions of the town. Dr. Lawrence had a large private practice, and was for many years senior surgeon on the honorary staff of the Darlington General Hospital. He was keenly interested in every advance in medical science and was held in the highest affection and esteem by all who knew him, not least so by his brother practitioners, who gave him a handsome presentation upon his retirement from the office of M.O.H. in 1911. Dr. Lawrence was a keen and versatile athlete in his youth, and never lost his interest in all branches of sport. He leaves a widow and five children.

INFLUENZA:

TREATMENT BY DIRECT STIMULATION OF LEUCOPOIESIS.

BY J. GRAHAM WILLMORE, M.R.C.S. ENG.,
AND
F. M. GARDNER-MEDWIN, M.R.C.S. ENG.

THE reappearance of influenza during the past few weeks, and the recent article in THE LANCET (Jan. 7th, 1922) by Major A. J. Todd on the treatment of severe cases of pneumonia and other infections by the production of fixation abscesses, give encouragement to the idea that an account—written in 1919—of a cognate method of treatment of the severe influenza of 1918 and 1919 may be of some interest now, in view of the possibility of the present mild type of this disease taking on some of the malignancy of the earlier epidemic. In this paper we give a table (Table II.) giving a précis of the clinical and blood findings in eight cases, taken from a small epidemic which broke out a few days ago in a dysentery ward. In no case was cause given for any anxiety—with the possible exception of "Kn"—there were no pulmonary complications, and no treatment beyond confinement to bed was necessary. It is significant that in none—again with the exception of "Kn"—is the leucocyte count below 6800.

In 1918 we observed and assisted in the treatment of a large number of cases of influenza of two distinct varieties, which we propose to call the "summer type" and the "winter type"; the assumption that they were fundamentally the same is strengthened by the fact that an attack of the "summer type" conferred immunity—in our experience absolute—against infection by the "winter type." The epidemic of simple type appeared in Egypt and Palestine during the period July to October, 1918; the complicated during the period November, 1918, to January, 1919. The clinical manifestations of both types were identical during the stage of invasion, and showed the rapid rise of temperature to 104° or over, headache, loin pain, general hyperæsthesia of the skin and myalgia, characteristic of the disease. The types differed strikingly in their evolution; during the summer epidemic one could more or less confidently expect a critical fall of temperature on the fourth day, followed by an uneventful convalescence, but during the winter epidemic the onset of pulmonary complications was to be dreaded precisely at that same period. The temperature also, apart from secondary lung infection, showed different curves; in the summer type it usually reached its maximum in the first 36 hours, with a fastigium rather lower during the next 48 hours, and then fell by crisis to normal on the fourth day; in the winter type it showed an initial rise, followed in 36 hours' time by a fall to nearly normal, with marked relief of the patient's distress. This false crisis, or "notch," lasted, as a rule, about 18 hours—occasionally longer—and was followed by a rise to higher than the initial fever, lasting several days and accompanied by a return in worse degree of the original symptoms. During the summer epidemic, the comparative absence of catarrh of the upper respiratory tract was in marked contrast to the frequency with which it early made its appearance during the winter epidemic.

The summer epidemic as seen in Egypt strongly resembled sand-fly fever, and it was largely the fact that the epidemic reached the proportions which it did in localities where no sand-flies could be found, coupled with its presence in other countries, which enabled a differential diagnosis to be made. This striking similarity to a disease known to be due to a filter-passing virus gave the idéa—a purely hypothetical one at the time, it must be confessed—that the summer influenza was of like origin.

The "Pro-Pfeiffer" and "Anti-Pfeiffer" Schools.

With the advent of the winter epidemic we became more and more convinced that the causative virus

was unknown, in view of the gradual conversion of the summer to the winter type with the coming of the colder weather, and the consequent frequency of the involvement of the respiratory tract. Three considerations, therefore, seemed to indicate a line of treatment:—

1. In the current literature on the subject two lines of thought gradually evolved themselves out of the tangle of bacteriological findings. These may be called the pro- and anti-Pfeiffer schools. They numbered among their adherents men of equal ability and experience; is it not possible that both were right—that such organisms as Pfeiffer's bacillus and the strepto-diplococcus were both secondary infections, missed. Such white blood counts as could be performed showed how important a factor this paralysis of the leucopoietic mechanism must have been in lowering the patient's resistance, and thus opening the gates of his system to invasion by any organism which chanced to be waiting on the threshold.

3. The clinical aspect of many of the severer cases suggested a very profound toxæmia, with vomiting and abdominal pain, and deep cyanosis of the type christened "heliotrope," and out of all proportion to the lesions found at autopsy in the lungs. The similarity of these cases to patients suffering from an acid toxæmia was striking, and the writers were indebted for the suggestion that they should be

TABLE I.—ANALYSIS OF 4 CONTROLS AND 12 CASES OF INFLUENZA WITH PULMONARY COMPLICATIONS DURING THE 1918–1919 EPIDEMIC.

Case.	White blood cells on day of disease.		Day of disease.		Maximum fever.	Clinical features.
	Before nuclein.	After nuclein.	Nuclein given.	Crisis.		
A	5,900	13,500	—	—	—	J. G. W. } Both healthy men. Second count 24 hours after first. Nuclein 0·05 muscularly immediately after taking blood count.
B	6,700	12,700	—	—	—	F. M. G.-M. }
C	12,400—5	—	—	—	—	} Bronchitis—no nuclein given. Not influenza.
D	14,000—8	—	—	—	—	
1	5,000—7	1,800—8 11,800—10	7 and 8	9	102·6	Clinical notes lost.
2	3,600—9	10,200—12	10 and 11	11	103	R. basal pneumonia, extreme toxæmia, cyanosis.
3	4,500—6	14,900—9	7 and 8	8	105	R. lobar pneumonia, extreme toxæmia, cyanosis, vomiting.
4	7,000—6	14,050—9	7 and 8	9	104·8	Double basal congestion, extreme toxæmia, cyanosis.
5	4,100—7	10,500—10	8 and 9	10	104·8	Double basal congestion, cyanosis of lips and face, tremor, delirium.
6	6,200—6	13,500—9	7 and 8	9	103	Basal congestion, cyanosis, vomiting.
7	4,800—5	5,000—8	6 and 7	7	104·2	Basal congestion, pink eyes, purple face, vomiting.
8	3,700—5	4,700—8	6 and 7	9	104·6	R. pleuro-pneumonia, malaria.
9	3,200—8	16,500—12	8 and 9	10	103·8	Extreme toxæmia, stupor, basal congestion, vomiting.
10	2,800—3	8,900—7	3 and 5	7	104·2	Extreme toxæmia, stupor, basal congestion.
11	10,800—15	20,400—19	15 and 16	18	102·2	Relapse, toxæmia, cyanosis, basal congestion.
12	3,200—9	7,200—10 18,300—13	9 and 10	12	104	Extreme cyanosis and toxæmia, stupor, temp. 104°, R. 60.*

* Appeared moribund on 9th day; on 11th day marked improvement, mentality clear, temp. 101°; expectoration of blood-stained muco-pus. On 13th day temp. normal, man convalescent.

TABLE II.—CLINICAL AND BLOOD FINDINGS IN 8 CASES; RECENT EPIDEMIC.

Case.	White blood cells on day of disease.	Crisis on day of disease.	Maximum fever.	Clinical features.
Bt. ..	6,800—5 P 46, L 43, LM 10, E 1	? Lysis	100	Convalescent after being dangerously ill with gangrenous bacillary dysentery. Antitoxin given 170 c.cm. between Nov. 18th and 25th. Influenza—headache, malaise, joint pains. No catarrh.
We. ..	13,000—4 P 64, L 24, LM 4, E 8	4	101·4	Acute amœbic dysentery. "Notch" on 2nd day. No catarrh. Headache, malaise, joint pains.
Kn. ..	5,000—3 P 29, L 59, LM 10, E 2	2	102·8	Convalescent from gangrenous bacillary dysentery. 380 c.cm. antitoxin between Sept. 24th and Oct. 2nd. Onset with rigor, headache, and joint pains. Later, nasal catarrh.
Rr. ..	8,600—6 P 45, LM 6, L 49	3	100·8	Headache and joint pains. No catarrh.
Gp. ..	12,200—5 P 57, L 34, LM 7, E 2	5	101·8	Convalescent amœbic dysentery, headache and joint pains. No catarrh.
Wg ..	11,600—5 P 66, L 22, LM 12	5	101	Old amœbic dysentery, lambliasis and nephritis, headache, &c. No catarrh.
Bl. ..	13,800—2 P 52, L 41, LM 4, E 3	2	100	Chronic bacillary dysentery, headache, &c. No catarrh.
Ld. ..	9,200—1 P 73, L 19, LM 8	At end of 18 hours.	100·2	An old malarial case—blood and spleen negative. More like an ordinary cold, but had headache and severe joint pains.

P = polymorphonuclear. L = lymphocyte. LM = large mononuclear. E = eosinophile.

pathogenic certainly, but grafted on to a soil previously prepared for their advent by the same resistance-lowering virus which is the specific cause of the epidemic? May not either organism have been the ordinary tenant, normally saprophytic, but becoming pathogenic given the necessary condition of lowered resistance on the part of its host?

2. The second consideration which determined a particular line of treatment was the marked leucopenia invariably found to correspond in degree with the clinical severity of the early uncomplicated cases. This leucopenia has been noted by many writers, but as far as one can gather its significance has been treated as such to Colonel J. M. Cowan, A.M.S., late consulting physician to the E.E.F.

Treatment.

Treatment was therefore twofold: (1) To stimulate the production of leucocytes directly by means of injections hypodermically or intramuscularly of sodium nucleinate; and (2) to neutralise the poison already circulating in the tissues (and presumably causing the leucopoietic paralysis among other toxic effects), by large doses of alkalies (sodium bicarbonate, 1 drachm, four-hourly), and by giving as much glucose in the food as patients would take. In the worst cases glucose was given also per rectum,

subcutaneously, or intravenously in a 3 per cent. solution, combined with sodium bicarbonate 2 per cent. Free purgation with calomel and salines, cardiac stimulants hypodermically (such as camphor in oil and caffein in a solution of sodium benzoate as required), and a mixture containing potassium iodide and creosote in cases where there was much muco-purulent expectoration, were concomitants in our treatment. The diet consisted of milk and glucose, and dilute albumin-lemon-glucose-barley water, of which the patients were encouraged to drink as freely as ever they could. Honey was given when it could be got.

In Table I. is shown an analysis of:

1. Four control cases, to demonstrate the effect of 0·05 g. of nuclein on the blood counts of two healthy men; and to make sure that ordinary non-influenzal bronchitis was not associated with the leucopenia typical of influenzal cases when occurring during the influenzal epidemic.

2. Twelve cases of influenza with pulmonary complications, all so seriously ill that a fatal issue was reasonably anticipated in every instance. They were typical of their class, and displayed marked cyanosis of the heliotrope type, rapid respiration, signs of pneumonic involvement, with bloody sputum, injected conjunctivæ, and a high degree of toxæmia as evidenced by mental hebetude or delirium and vomiting. All made an uneventful recovery.

All the above cases occurred in December, 1918, and the first half of January, 1919—i.e., during the severest period of the epidemic. They represent only a small fraction of the actual number of cases under our care, and we greatly regret that we are unable to publish a complete list, giving statistics and an account of the relative mortalities under different systems of treatment. From actual experience, we feel confident that, were we able to do so, this paper would have a much more convincing ring, free from the reproach of being merely a pious expression of opinion.

Failure to furnish complete lists is due mainly to the facts that the hospital was broken up immediately the epidemic began to subside, and that one of us was invalided out of the country shortly afterwards; as a result, most of the records and case sheets were not available for reference and many of our notes were lost. The chart of Case 4 showed the rapid initial rise of temperature, the false crisis or "notch," already mentioned, the secondary rise of temperature, accompanied by a fall in the leucocyte count; and the effect of nuclein in producing a rise in the leucocyte count and a true critical fall of the temperature. The sodium nucleinate used is a product of the Clin Laboratories, Paris, and is put up in ampoules of 2 c.cm. containing 0·05 g. per c.cm. The usual single dose was 1 ampoule, injected intramuscularly; it generally gave rise to a certain amount of pain and stiffness, but patients often asked for a second dose, as they said it gave them a feeling of well-being. Doubtless any other agent, such as leucocytic extract, which increases the leucocyte count to the same extent as does nuclein, would answer the purpose equally well.

In nearly all cases, improvement of the patients' general condition followed the injection of the nuclein so rapidly and strikingly that we were forced to the conclusion that the crisis was actually precipitated by it, and was independent of the day of disease; it usually occurred 48 hours after the first injection, a patient being almost moribund one day and comfortable and cheerful the next. There was a curious resemblance in these patients to certain cases of early acute bacillary dysentery after a massive dose of anti-dysentery serum, in that the euphoria did not correspond with the devolution of the physical signs. In some cases the spitting of blood-stained sputum only showed itself a few hours before the remedy was given, continuing for some time after the temperature was normal and the patient at his ease; in two cases physical signs of pneumonia actually appeared only after the marked improvement in the general condition, and cyanosis often persisted for two or three days afterwards.

THE SIGMA REACTION FOR SYPHILIS.

A COMPARISON WITH THE WASSERMANN REACTION AND WITH CLINICAL FINDINGS.

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SINCE the demonstration of the Wassermann reaction for syphilis there have been introduced, at one time and another, further tests, some merely slight modifications of the original, others differing more widely. All, however, have the common aim either of simplifying the technique or making the results more delicate. None which have been brought forward up till now have met with general approval, though several observers, especially on the continent, have reported favourably on flocculation tests of various kinds. Recently Dreyer and Ward,[1] working in the Department of Pathology of Oxford University, have described a flocculation test which in their hands has given very encouraging results, and which has certain very distinct advantages over the Wassermann reaction. To this reaction they have given the name of the Sigma (Σ) reaction.

Technique of the Sigma Reaction.

The technique of the reaction is very fully described by Dreyer and Ward in their original article.[1] Very briefly it is as follows:—

An antigen, which is a mixture of an acetone-free alcohol-soluble heart extract and cholesterin, originally described by Bordet and Ruelens[2] is used. This is very carefully diluted by a special method so as to give a standard opacity. To a quantity of this antigen varying quantities of inactivated serum, which is to be tested, are added by a drop method, using a Dreyer's pipette and Dreyer's tubes. The resulting dilutions, allowing for differences in the size of the drop, are 1 in 1·25, 1 in 2·5, 1 in 5·2, 1 in 13·1, 1 in 26·4, 1 in 46, 1 in 92, 1 in 232, and 1 in 462.

The nine tubes are then put in a water-bath at 37° C. for seven hours and finally are read in a special illuminating chamber, using a hand lens. A positive reaction is shown by the appearance of flocculation. The amount of flocculation varies from a complete sedimentation of large flocculi leaving a clear upper fluid, to very fine flocculi only just visible with the lens. Different values, which increase with the size of the flocculi, have been given to these different types of flocculation. These values, when multiplied by the dilution, gave a figure known as the number of flocculation units.

It has been found that different batches of antigen vary as regards the sensitiveness of their suspensions, hence a further factor is required in order to compare the results given by different workers. Each batch of antigen, therefore, requires comparison with a standard antigen and the estimation of a so-called "suspension factor." The number of flocculation units when multiplied by the suspension factor gives a figure known as the standard flocculation units or Σ units.

Interpretation of Results.—A serum containing less than 1 Σ unit is considered as negative. Sera containing 4 or more units are considered to give a positive reaction. Sera containing 1 to 4 units are not regarded as positive unless repeated and confirmed, or unless there is a definite history or suspicious clinical signs of syphilis. A cerebro-spinal fluid containing less than 1 unit is considered as negative—containing more than 1 unit, as positive.

Remarks on Technique.

The chief feature of the technique described by Dreyer and Ward is the extreme simplicity and accuracy. Instead of five variable substances, as in the Wassermann, there are but two; the antigen used is easily standardisable and does not seem to vary in strength even over long periods. The chief difficulty of their technique is the time consumed in the various manœuvres, especially in repeatedly cleansing the pipette. Despite the fact that it is rarely necessary to complete more than the first five dilutions, yet it takes fully two hours to prepare a dozen tests for the water-bath. Unfortunately the Dreyer pipette is not at present standardised and, as shown by Donald,[3] two pipettes may vary very

considerably as to the size of their drops. Hence it is especially emphasised[1] that one and the same pipette must be used throughout the whole operation, the pipette being cleaned out carefully after each stage with distilled water, followed by successive quantities of absolute alcohol, followed by successive quantities of ether.

By far the larger number of the tests in this series were carried out, using a different pipette for each serum, but the same pipette for antigen and saline. On the pipette used for the latter two solutions two bulbs were blown and a large rubber test used, so as to increase the capacity. Using this method 32 tests can be prepared in under two hours. As pointed out above, this necessarily causes an error in the Sigma unit number, as the dilutions will vary slightly owing to the different sizes of the drops.

In order to estimate the amount of error all the pipettes were calibrated by the method described by Donald,[3] using 95 per cent. alcohol as the dropping fluid. In 35 out of 36 pipettes, between 56 and 61 drops were required for the 1 c.cm. The antigen-saline pipette required between 58 and 59 drops. The remaining pipette, which gave 64 drops to the 1 c.cm., was discarded. The resulting error from using different pipettes is thus extremely small.

In order to avoid this error the following methods were tried:—

1. The pipettes were carefully calibrated and numbered, a correction being made in the number of units given by a positive serum. About 500 of the tests in this series were done by this method.

2. By using somewhat different dilutions measured quantities of the reagents were used. The disadvantages of this method are that often more serum is required than is obtainable, or else such small quantities must be used that it is doubtful if there is any increase in accuracy. About 60 of the tests were done by this method.

3. Throttled pipettes made and calibrated according to the method described by Donald[3] were used. This method ensures great accuracy, and once the gauge has been obtained any number of accurately dropping pipettes may be rapidly made with the material which is to hand in any laboratory. When a large number of tests are being prepared the antigen and saline may be dropped from a separating funnel, using a Mariotte tube, as described in the same article. This method helps to lessen the time taken in putting out the test. A few tests in the series were done by this method.

Comparison of Technique with the Technique of the Wassermann Reaction.

It has been said that the technique of the Wassermann reaction is one of the most complicated that has ever been applied, on a large scale, for diagnosis. Even though all the reagents be most carefully standardised, cases occur in which, for some unknown reason, the substances used do not seem to react properly. An instance of this occurred in an inquiry into the diagnostic value of the Wassermann reaction undertaken by the Medical Research Committee.[5] In this case, one batch of five sera tested by one of the serologists gave results not in accordance with those of the other two serologists who were testing the same sera, or with the results of clinical findings.

In comparision with this complicated technique, the technique of the Sigma reaction seems extraordinarily simple. Guaranteed that extreme care is taken in putting up the test, there seems little to go wrong. The actual putting up of the Sigma reaction undoubtedly takes longer to do than the putting up of the Wassermann. This longer time is, however, compensated for by the absence of any preparation of complement, standardisation of complement, or preparation of red cells.

Analysis of Results.

Altogether 927 tests of specimens were done. The first 50 tests are regarded as serving the purpose of learning the rudiments of the technique and are consequently omitted. A certain number of the remaining tests were of the nature of experiments and are also omitted; a few were spoiled, while, owing to the mixing of some of the sera in transmission and other similar causes, a further few results have been discarded.

Before tabulating the results, two sources of error which occur throughout the series require consideration. When the series was almost completed an opportunity occurred, through the kindness of Dr. H. K. Ward, to compare what had been regarded as standard flocculation with the standard used by the authors of the reaction. It became evident from this comparison that all results had been slightly underestimated. Secondly, he pointed out a source of error in the technique which had been entirely overlooked. The agglutination tubes which were being used, sold in England as Dreyer's agglutination tubes, vary very considerably in their internal diameters. In some manner this influences the number of Sigma units in a positive serum, just as in the case of the agglutination of bacteria the width of the tubes has been shown to influence the number of agglutinin units found. If the same positive serum is put up in two sets of tubes, one set made up of the larger tubes, the other of the smaller ones, the former set will almost invariably give a smaller reading of Sigma units than the latter. Hence it is obviously necessary to use tubes of the same internal diameter. Dr. Ward took a few of the tubes used in this series to compare them with the tubes in use at Oxford. He found that the Oxford tubes gave nearly 33⅓ per cent. higher readings. Thus both sources of error tend to make all positive results somewhat lower in Sigma units than they really should be.

The mode of returning results of the Wassermann reaction, with which all cases were compared, is as follows:—

A double plus (++) result is recorded when complete absence of hæmolysis occurs in two tubes, one containing three times the M.H.D. of complement and the other six times the M.H.D.

A single plus (+) means complete absence of hæmolysis in the tube containing the smaller dose of complement only.

A partial plus (±) means partial hæmolysis in the tube containing the smaller dose of complement.

A negative (−) is recorded when both tubes show complete hæmolysis.

Comparison with the Wassermann Reaction.

Group 1.—This group contains sera from patients whose clinical history was obtainable and which had been sent in more especially for diagnosis. A few cases of known syphilis which had been treated some years previously are included—all recently treated cases are excluded.

In order to make the comparison as fair as possible, the following interpretation of results has been used in this group:—

A ++ Wassermann reaction both in the blood serum and in the cerebro-spinal fluid has been taken as positive and a − result as negative.

A + and a ± result have been considered as positive if there was a definite history or any clinical signs of syphilis, but have been considered as negative if there was no such history or clinical signs.

The interpretation of the Sigma reaction is as previously quoted.

Total number of cases in this group	231	100%
Number agreeing with the Wassermann reaction	221	95·7%
Number disagreeing with the Wassermann reaction	10	4·3%
Number of cases regarded clinically as syphilitic	108	46·7%

(The diagnosis was made, in all cases, by the physician or surgeon in charge of the department at which the patient was attending.)

In the tables the cases regarded clinically as syphilitic have been divided into a usual grouping and the results of the two reactions compared.

Remarks on Results Obtained in Untreated Cases.

Of the 10 cases in this group giving discordant results, six occurred in the blood serum and four in the cerebro-spinal fluid. One of the six cases occurring in the blood serum must be disregarded (namely, No. 295) on account of the fact that anæsthetics have been considered to produce erroneous positive Wassermann reactions[6] and of the very doubtful history of a chancre. In four out of the other five cases, the Sigma reaction was more in accord with

clinical findings than was the Wassermann. In four out of the four disagreements in the cerebro-spinal fluid the Wassermann reaction was more in accordance with the clinical findings. Thus it will be seen that in the series brought forward the Sigma reaction has been slightly more delicate than the Wassermann reaction in the blood serum, while in the tests on the cerebro-spinal fluid the Wassermann reaction has been distinctly more delicate. Unfortunately these latter tests have been very few in number.

During the course of this investigation, of the comparatively few cases seen, at least six, with no history or clinical signs of syphilis, have given a single + Wassermann on the first occasion on which a specimen was tested. A second specimen taken a few days later has been returned as negative, despite the fact that there has been no antisyphilitic treatment given in the interval between the tests. Some of these cases possibly belong to the so-called "latent" stage of syphilis, when the Wassermann reaction is admittedly uncertain, but the majority were very closely questioned and examined for any evidence of syphilitic infection, but none was forthcoming. Only one case, other than Case 921 quoted in Table III., was met with in which there was good reason to doubt the accuracy of a + + Wassermann reaction. (The Sigma reaction in this case was not done.) The patient, a girl aged 13, was admitted with a much enlarged and hard liver, jaundice, and ascites. A + + Wassermann reaction was obtained in the blood serum soon after admission. Anti-syphilitic treatment was of no avail, the patient dying. Post mortem the liver resembled the hob-nail liver of alcoholic cirrhosis. The Wassermann reaction was done on all other members of the family. All proved to be negative. It has, however, been pointed out by several observers that patients with liver lesions tend to give erroneous positive Wassermann reactions, and it seems probable that this case, and Case 921, should be placed in this category.

Group 2: Treated cases.—Only cases undergoing treatment, or which have been recently treated, are included in this group. For the purpose of comparison in these treated cases, any degree of positivity in either test is regarded as positive—only completely negative results are recorded as negative.

From the above it will be seen that there was a fair proportion of disagreements in this group: in some cases the Wassermann has remained positive for a longer period, in others, the Sigma. In general it may be said that the Sigma reaction has been the more consistent—the unit figure usually more or less slowly decreasing until it became negative, at which it remained while the case was under treatment. Any increases were small and lasted only a short time. It will be seen that the greater delicacy of the Wassermann reaction in the cerebro-spinal fluid, noticed in Group 1, is also shown in this group.

TABLE I.—*Blood Serum.*

	Wassermann.						Sigma.					
—	Total.	+ +	+	±	−	Per cent. positive.	Above 20 units.	10–20 units.	4–10 units.	1–4 units.	Below 1 unit.	Per cent. positive.
Primary	16	4	4	—	8	50·0	—	1	5	3	7	56·2
Secondary	30	30	—	—	—	100·0	24	3	3	—	—	100·0
Latent	18	14	1	—	3	83·3	10	1	3	2	2	88·8
Tertiary	13	12	1	—	—	100·0	11	—	—	2	—	100·0
Parasyphilis	16	10	—	—	6	62·5	7	—	1	2	6	62·5
Congenital	3	2	1	—	—	100·0	2	—	—	1	—	100·0
Total	96	72	7	—	17	82·3	54	5	12	10	15	84·4

TABLE II.—*Cerebro-Spinal Fluid.*

Parasyphilis	12	8	3	—	1	91·6	3	—	2	2	5	58·3

The following cases are typical examples of the action of treatment on the reaction. (S.U. = Sigma units; Wass. = Wassermann.)

CASE 82.—Male. Primary sore of 10 days' duration when first seen 18/5/21.

	S.U.	Wass.		S.U.	Wass.
10/6/21	8·2	+ +	29/6/21	6·2	+
14/6/21	6·5	+ +	12/7/21	4·0	−
17/6/21	7·4	+	8/8/21	1·7	−
20/6/21	7·4	+	13/9/21	0	−

CASE 180.—Male. Primary sore 12/4/20.

	S.U.	Wass.		S.U.	Wass.
21/6/21	37·2	+ +	3/7/21	12·7	+ +
29/6/21	16·9	+ +	23/8/21	5·3	+ +

CASE 357.—Male. Secondary 8/7/21.

	S.U.	Wass.		S.U.	Wass.
12/7/21	92·0	+ +	23/8/21	4·75	−
5/8/21	41·5	+ +	13/9/21	13·3	+ +
16/8/21	15·2	−			

CASE 812.—Male. Sore on frænum of nine days' duration when first seen. (16/8/21) Smear for treponema positive. Inguinal adenitis.

	B.S.	S.U.	Wass.		B.S.	S.U.	Wass.
26/8/21	0	0	−	5/9/21	3·8	0	+ +
29/8/21	0	0	−	9/9/21	0	0	+ +
2/9/21	0	0	−	16/9/21	0	0	+ +

Group 3: Cases in which the clinical history was unknown.—In the interpretation of results in this group + + and + are taken as positive, and ± and − as negative for the Wassermann reaction; for the Sigma, four units and above are taken as positive, below four units as negative.

(A) *Blood Serum.*

Total number of tests	49	
Number of cases in which the reactions agreed	45	= 91·8 %
,, ,, positive agreements	18	= 36·7 %
,, ,, negative ,,	27	= 55·1 %
Number of cases in which reactions disagreed	4	= 8·2 %
Of these the Wassermann was positive in	2	= 4·1 %
Of these the Sigma was positive in	2	= 4·1 %

(B) *Cerebro-spinal Fluid.*

Total number of tests ... Nil.

Remarks on the Wassermann Reaction.

Few pathological processes have aroused such a volume of literature in the last few years as has the Wassermann reaction. The detractors of the reaction are not few. In most instances they have sought to disprove its value by bringing forward discordant results. The usual method has been to divide a serum and send it to different laboratories. In many cases the results obtained have been extraordinarily divergent (7/8/9). These divergences are

(A) *Blood Serum.*

Total number of tests	377	= 100·0 %
Number of cases in which the reactions agreed	302	= 80·2 %
Number of positive agreements	125	= 33·2 %
Number of negative agreements	177	= 47·0 %
Number of cases in which reactions disagreed	75	= 19·8 %
Of these the Wassermann was positive in	38	= 10·0 %
Of these the Sigma was positive in	37	= 9·8 %

(B) *Cerebro-spinal Fluid.*

Total number of tests	12	= 100·0 %
Number of cases in which the reactions agreed	7	= 58·3 %
Number of positive agreements	1	= 8·3 %
Number of negative agreements	6	= 50·0 %
Number of cases in which reactions disagreed	5	= 41·7 %
Of these the Wassermann was positive in	5	= 41·7 %
Of these the Sigma was positive in	0	= 0

possibly due to fluctuations in the sensitiveness of the Wassermann reaction as Dreyer and Ward[1] believe, or possibly to alterations in the amount of Wassermann substance occurring in the specimen after the withdrawal from the patient. It is possible to alter the reaction of a serum by such methods as infection or by repeated cooling as pointed out by McDonagh.[10] That the former is the more likely explanation is shown by the works of Simons, Jones, and Goddard.[11] These observers found that, despite careful standardisation, the results obtained by different workers on the same sera were often contradictory, but when different workers used the same reagents, the percentage of divergencies was very much lessened.

Attempts to standardise the test have been made from time to time in most countries, but, owing to the extreme difficulties, have not materialised. Some competent observers doubt the possibility of ever standardising the reaction in its present form. Much of the dissatisfaction felt by clinicians with regard to the Wassermann is undoubtedly due to the method of returning results. Unless the clinician is "au fait" with the exact meaning of the terms used by each particular laboratory and, further, has carefully followed the literature with regard to the diagnostic value of the Wassermann reaction, he may easily fall into error.

Craig,[4] analysing 18,000 blood tests done by himself, considers that a single plus reaction (he uses the four signs, ++, +, ±, and −) may be interpreted as diagnostic, provided there is a clear history of infection or there are clinical signs usually regarded as syphilitic. In the absence of these, a single + would never be considered as diagnostic. He states further that a + result is given by many normal individuals. If this value of a single + result is the test, as usually performed, be admitted, then to call it positive simply misleads the unwary and implies a meaning other than that intended by the serologist.

TABLE III.—*Clinical Details of Cases Giving Discordant Results.*

(A) *Blood Serum (B.S.).*

Case No.	Sex.	Clinical details.	Date.	Fluid tested.	Wn.	Σ.	Remarks.
174	M.	Early primary (penile).	17/6/21 20/6/21	B.S. B.S.	− +	9·0 0	An injection of an arsenical compound was given on 17/6/21.
253	M.	,,	25/6/21 29/6/21 15/7/21	B.S. B.S. B.S.	++ ++ −	0 8·5 0	Ditto on 25/6/21.
295	M.	Admitted for operation on a urethral stricture.	5/7/21 12/7/21	B.S. B.S.	++ +	0 0	First specimen was taken while patient was under anæsthetic. History of doubtful sore on penis some time previous. No signs of syphilis now.
824	F.	Mother of child with congenital syphilis.	2/9/21 19/9/21	B.S. B.S.	− ++	4·75 6·46	No treatment in interval between tests.
832	M.	Primary (penile).	6/9/21 13/9/21	B.S. B.S.	− +	2·85 0	Injection of arsenical compound given on 6/9/21.
921	M.	Irregularly enlarged hard liver. Wasting in an elderly man.	19/9/21	B.S.	++	0	Patient died on 4/10/21. Post-mortem extensive secondary deposits of growth in thoracic and abdominal viscera. Position of primary growth uncertain.
			(B) *Cerebro-Spinal Fluid (C.S.F.).*				
563	M.	Tabes dorsalis; phthisis.	5/8/21	B.S. C.S.F.	++ +	3·1 0	Examination of C.S.F. for cells and protein normal.
711	M.	Tabes dorsalis.	23/8/21	B.S. C.S.F.	− ++	0 0	Examination of C.S.F. for cells and protein: white cells 1 per c.mm.; protein 0·025 per cent.
734	F.	,,	23/8/21 6/9/21	B.S. C.S.F. B.S. C.S.F.	++ ++ ++ +	50·0 0 50·0 0	Mercuric chloride and pot. iod. mixture was given between the two tests. No injections.
918	M.	,,	19/9/21	B.S. C.S.F.	− ++	0 0	Examination of C.S.F. for cells and protein: white cells, 1 per c.mm.; protein, 0·07 per cent.

Summary.

1. The Sigma reaction for syphilis described by Dreyer and Ward is much simpler in technique than s the Wassermann reaction.

2. The results of the series here reported would seem to show that the results as regards blood serum tests in untreated cases are as good, or even slightly better than the results obtained by the Wassermann reaction, when judged from a clinical standpoint.

3. The results obtained in the cerebro-spinal fluid have not been so good as have the results of the Wassermann reaction. These cases are, however, so few that it is impossible to draw any inference from them.

4. The test is easily standardisable, both as regards technique and reporting of results.

5. Being a quantitative reaction it is possible that important information as to prognosis or the effect of treatment may result in the light of further knowledge.

I should like to take this opportunity of thanking Prof. J. W. H. Eyre for the laboratory facilities and assistance which he has given me; Miss M. Rawlins and Dr. G. B. Dowling for supplying me with specimens and with the clinical histories; Dr. H. K. Ward, Dr. C. P. Symonds, Mr. T. Skene Keith, and Mr. E. Biddle for much kindly criticism and advice; Mr. E. J. Crisp, Mr. S. Cohen, Mr. R. J. Hodgkinson, and others for supplying specimens from interesting cases.

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BILIOUS ATTACKS AND EPILEPSY:

THE RELATIONSHIP OF THE BILIOUS ATTACK AND CERTAIN OTHER MORBID PHENOMENA TO THE EPILEPTIC STATE.

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THE relationship between so-called migraine and epilepsy has repeatedly been discussed in medical literature. The balance of opinion has usually been with those who believe that their association is merely that of two conditions expressing instability of the nervous system occurring in the same patient. In the text-book migraine and epilepsy are usually included in the same section along with certain functional states, such as habit-spasm and the tics, and reference is occasionally made to the fact that the two conditions may occur and alternate in the same patient. On the other hand, many authorities appear to ignore the fact that any relationship exists. Sir William Gowers drew attention to the association of migraine and epilepsy in his book "The Borderland of Epilepsy," published in 1907, and the following extract sums up his opinion as to the closeness of their relationship.

"The traces of a definite relation of migraine to epilepsy are slight. In extremely rare instances one affection may develop while the other goes on and, as we have seen, the same premonitory disturbances may even be attached to each. But such cases are so rare as rather to emphasise the rule to which they form exceptions. When the exceptions are carefully examined they show that any relationship to epilepsy is indirect. Epilepsy develops from migraine as an indirect consequence of the effect of the intense pain and associated cerebral disturbance. . . . . The most frequent relation of migraine to epilepsy is as a source of error. Yet the difference between the two affections is definite and distinctive. Their antecedents differ. When heredity is to be traced in epilepsy the antecedents present either the same disease or insanity."

Dr. Aldren Turner in his book—also published in 1907—refers to the association of periodic headache or bilious attack with epilepsy, and expresses the opinion that while being interchangeable they are not identical, but merely combined in the same individual or family possessing the neurotic diathesis.

Periodic Bilious Attacks as a Warning Signal of Epilepsy.

During the personal study of a series of cases of epilepsy I found that certain phenomena, of which the bilious attack is the most important, occurred with such frequency as a precursor to or in association with epileptic attacks, that I received the impression that they were more closely related to than merely associated with the epileptic state, and that possibly their ætiological basis and mechanism of production were the same. Seeing that the causation of epilepsy is still shrouded in mystery, little good can come from discussion of the subject from this point of view, but it appears to me that the frequency with which the bilious attack may precede the epileptic fits, and its not infrequent occurrence as an associated condition, makes it advisable that further attention should be drawn to their relationship in order that the periodic bilious attacks may be looked upon as a warning signal, and the care and treatment of the patient carried out accordingly.

Frequency of Bilious Attacks in 240 Cases of Epilepsy.

In my series of 240 cases of epilepsy at all ages, information as to the occurrence of the bilious attack was obtainable from 194 of the patients, and amongst these patients a history of well-defined bilious attack was obtained from 73 cases, of atypical attacks from 5 cases, and attacks of periodic headache in 10 cases. In approximately a third of the cases, therefore, attacks of this nature had occurred. Of these 88 cases the bilious attack or periodic headache had preceded the epileptic period and had continued as an associated phenomenon in 48 cases, had preceded the epilepsy and ceased completely with the onset of the epileptic fits in 20 cases, had preceded the epilepsy and had ceased well before the epileptic period in 5 cases, and had appeared as an associated phenomenon during the "fit" period in the remaining 15 cases. Of the 68 cases in which the attacks had preceded and continued up to the onset of the fits, on 22 occasions they had occurred with periodic regularity for a period of 10 or more years previous to the fit period, and in 32 cases for five or more years. In 72 of the cases the bilious attacks began before the age of 13 years, and in many of the cases they had dated from infancy. The bilious attack occurs with greater frequency in the female subject; 66 of the 88 cases were females and 22 were males. My full series of cases, however, shows a predominating female element, 156 being females and 84 being males.

A criticism might be put forward that as "bilious headaches" are of such common occurrence amongst the general population they possibly occur as frequently in the non-epileptic subject as in the epileptic. In order to test this possibility a hundred adult persons of the hospital class not attending for epilepsy were used as controls, and inquiry made concerning this point; it was found that in 21 of the 100 controls periodic headache of the type under discussion had occurred, but it is of interest to note that of these 21 persons 11 gave a history of definite epilepsy, 3 in the personal history and 8 in near relatives.

Migraine.

The term migraine originally meant hemicrania, the one-sided paroxysmal headache accompanied by certain sensory and visual phenomena. The expression has come to be applied to any head pain of periodic and paroxysmal character, and under this heading are probably grouped phenomena of widely different origin. In my own experience the bilious attack or bilious headache associated with the epileptic state is clearly defined in certain characteristics, although its intensity may vary within fairly wide limits. The attack nearly always starts in the early morning—in fact the patient wakes with a severe prostrating headache which continues for a period of hours or for the whole day—and is accompanied by extreme nausea and distaste for food. The attack is frequently accompanied by vomiting, which usually occurs towards the end of the attack, and appears to bring the latter to a close. The pain may start over one eye, and may rapidly become generalised, but it may have a frontal or occipital concentration—usually the former. This type of headache is rarely hemicranial in character, nor have I found it to be accompanied with the visual phenomena so often associated with true hemicrania, although dimness of vision and distaste for strong light is not uncommon. The morning onset of the bilious attack is of special interest, seeing that the true epileptic fit so frequently takes place in the early hours or immediately upon the patient getting up. A discussion as to the cause of the bilious attack is beyond the scope of this paper, and would probably lead to as little result as a discussion of the causation of the epileptic fit. It does, however, appear to me that the bilious attack has little to do with the digestive system and is probably nothing more or less than a "nerve storm" with much the same ætiological foundation as epilepsy. This probability is supported by the results of treatment. Treatment with full doses of bromide is most effective in bringing the bilious attack to an end. Children are particularly liable to periodic attacks during which headache and vomiting take up a prominent position, and such attacks no doubt range between an acetonæmia attack, acute dyspepsia, and the type of attack under discussion. I have never found acetone in the urine following a bilious attack, although opportunity for examination has been limited. In cases of acetonæmia the vomiting takes the more prominent position and occurs early, while in the bilious attack the headache is the more prominent feature and precedes the vomiting.

Close Association of the Periodic Bilious Attack and Epilepsy.

It is usually stated that migraine and epilepsy alternate, but in my experience epilepsy is more often a sequela, although after the onset of the epileptic fits the two conditions may continue as associated events. One of my reasons for suggesting that the two have some very close relationship is the frequency with which epilepsy follows on with no intervening period of freedom.

The following cases illustrate this frequency.

Ethel A., aged 22 years, has suffered from typical bilious attacks from early childhood; these continued periodically until the age of 17 years, when major epileptic attacks began, and they have since been associated with the epileptic attacks.

Robert H., aged 13 years, began when 7 years old with bilious attacks which continued until major attacks started at 9 years; the bilious attacks then ceased.

Hannah C., aged 12, suffered from a single batch of convulsions at 18 months. Typical bilious attacks began in early childhood and continued until 11 years old, when major attacks began; since then no further bilious attacks have occurred.

In other cases the association appears to become so close that it would seem that fusion takes place between the bilious and epileptic attacks.

Henry P., aged 14, began at 3 years old to have bilious attacks which continued until the present fits began some months ago. The fits are serial in character, each series being immediately preceded by a bilious attack.

Alice H., aged 15, had typical bilious attacks during school age. From 10 years old she had "rigid attacks," with fixed gaze and slight twitching lasting a few seconds; each of such attacks would end with headache and vomiting. When 13 years old she had the fully developed type of fit.

Cyril T., aged 14, has had infrequent major attacks from the age of 7 years. On each occasion a severe bilious attack has immediately preceded or ended the fit.

Faints.

A number of my cases gave a history of attacks described by the patient or her friends as "faints" during the years preceding the "fit" period. With a good many of these attacks rigidity occurred, with hand clenching, and occasionally with laryngeal spasm, but in some cases the patient is described as being pale, lifeless, and relaxed. In my experience the bilious attack has been especially common in such cases, and has not infrequently occurred at the time of the "faint."

Elsie K., aged 8 years, had convulsions from the age of 2 months to 2 years. From 2 years old she had bilious attacks, and at 7 years old she began to have "faints" at the time of the attack. She suddenly turns pale, falls, and lies quite still with rigid limbs. After some minutes she begins to vomit and complains of severe headache.

Louisa A., aged 40, had a single major fit at 6 years old. At 13 years old she developed severe bilious attacks, usually at the time of her monthly periods. At 30 years she began to have "faints" at the time of her bilious attacks. At 32 years fully developed major attacks occurred and have continued since.

Annie H., aged 42, developed severe periodic bilious attacks at 13 years old. Her menstrual periods began at 16. The bilious attacks during her teens were accompanied by unconscious attacks described as "faints." The major attacks began during her first pregnancy at 29 years old.

Influence of Heredity.

It is of interest to examine the influence of heredity in connexion with both epilepsy and bilious attacks. An epileptic history on the father's side of the family was obtainable in 13 cases and on the mother's side in 19 cases, while a history of fits amongst the brothers and sisters of the patient was found on 9 occasions. On the other hand, a history of bilious headache was obtainable in 36 cases, in 6 cases in the father or his family, in 24 cases in the mother or her family, while it had occurred amongst the brothers and sisters in 6 cases. A combination of epilepsy and bilious attacks had occurred on the father's side in only 2 cases, and on the mother's side in 7 cases. An epileptic heredity, therefore, was traceable in 32 cases and a bilious attack heredity in 30 cases.

Nocturnal Enuresis.

Apart altogether from incontinence of urine accompanying an epileptic fit, nocturnal enuresis occurred as a separate phenomenon in 43 of the cases, and only those cases are included in which the condition had existed for some years. Nocturnal enuresis has long been recognised as an occasional expression of the epileptic state, but its occurrence in something like a fifth of the cases suggests a greater frequency than is usually attributed to it. In 22 of the cases it occurred for one or more years prior to the onset of the epileptic fits and was continued as a separate phenomenon after the fits began. In 11 cases it occurred for the first time with the onset of the fits. In 4 cases it began prior to the fits and ended with the onset of the fits, and in 7 cases it had occurred prior to the fits and had ceased well before the fit period began. In 35 of the 43 cases the enuresis began before the age of 5 years and in the majority of cases actually dated from infancy, the child never having acquired control during the night. The fits following a period of nocturnal enuresis are themselves sometimes nocturnal in occurrence, as in the case of Clara W., aged 15, who suffered from nocturnal incontinence from infancy until the age of 12 years, when fits began, always of the nocturnal variety.

Somnambulism: Multiple Phenomena.

A history of sleep-walking was obtained in 12 cases, and in 9 of these it had preceded the fits by some years; and in 5 of the cases ceased when the fits began. In some cases there is a history of multiple phenomena alternating or following each other, as in the following cases.

Tom F., aged 16 years, has suffered from nocturnal enuresis from early childhood. At 7 years old bilious attacks began and at 14 years there occurred fully developed major epileptic attacks.

William C., aged 20, has had nocturnal enuresis all his life. From the age of 6 years to 13 years he had typical bilious attacks and with these attacks he also had "falling attacks," each attack lasting for a few seconds only. At 13 years old both the bilious and "falling" attacks ceased. At 17 years major epileptic attacks began and have continued since.

It is of interest to note that in the last case attacks of epistaxis bridged over the period between the cessation of the bilious attacks and the onset of the major fits. Epistaxis has been noted in two other cases.

Conclusion.

The evidence presented above is brought forward with a view to emphasising the possibility of the "bilious attack" and other morbid phenomena occurring in the child and adolescent being in some cases an expression of a potentially epileptic nervous system. The secret of the prevention of epilepsy probably lies in the patient's preceding generation or generations, and to attempt its prevention in the child is at least more satisfactory than to attempt to produce a cure when epilepsy has fully developed. The recognition, therefore, of the possible relationship of these phenomena to the epileptic state and their active and prolonged treatment, together with suitable control of the child's life, may go a long way in the prevention of the development of the convulsive habit.

SMALL-POX OUTBREAK AT SADDLEWORTH.—Dr. H. Ramsden, medical officer of health for Saddleworth U.D., stated at a recent meeting of the Council that the small-pox of which several cases had been reported from Northwich, Diggle, and Dobcross was not the ordinary form of the disease; he described it as a very mild type of small-pox, similar to that which had been described in America under the name alastrim. From one school 20 children were absent. At Huddersfield there were 80 cases of small-pox. Unvaccinated people were suffering most; at Northwich four unvaccinated children had contracted small-pox, and a fifth child who had been vaccinated had escaped. The Council decided to make chicken-pox notifiable, to issue posters, to open the isolation hospital at Runninghill, and to make arrangements for vaccination.

RESEARCHES ON THE CINCHONA ALKALOIDS.

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QUININE is generally regarded as a methoxy derivative of cinchonine, but since quinine is lævorotatory and cinchonine dextrorotatory in their optical activity, it seems probable that quinine is not derived from cinchonine. In a previous paper in THE LANCET, June 12th, 1920, I pointed out the isomeric relationship between the different pairs—e.g., quinine and quinidine—but purposely avoided mentioning whether quinine was related to cinchonine or cinchonidine, as I had not studied the pharmacological action of these alkaloids. The true relationship, as this work will show, is: cinchonidine, cuprein, and quinine—all lævorotatory alkaloids belonging to what I propose to call the "cinchonidine series"; and cinchonine, cupreidine, and quinidine—all dextrorotatory alkaloids, the "cinchonine series." The names of these alkaloids cannot now be altered, as such alteration would only lead to a more hopeless state of confusion; the nomenclature is very confusing, as the names cinchonine and quinine suggest a relationship which does not exist. This error arose from the fact that these two alkaloids were isolated within a short time of each other by Pelletier and Caventori (1820), in the days when the relationship between optical activity and constitutional formula was unknown. Once the mistake had occurred, it was copied from text-book to text-book. The isolation of cinchonidine and quinidine, occurring several years later, did not help to clear up the mistake in their relationship, as quinine was considered to be the only alkaloid of therapeutic importance in cinchona bark. Cushny (1903) states the accepted opinion as follows: "These alkaloids have been used occasionally as substitutes of quinine, but have somewhat less therapeutic effects, whilst cinchonidine is more liable to produce symptoms of poisoning. They might all be dispensed with, without loss to therapeutics." Cushny evidently means cinchonine when he writes cinchonidine.

As cuprein could be synthetically converted into quinine, which was considered the most important alkaloid, it naturally followed that the compounds tested pharmacologically should be prepared from this lævorotatory alkaloid of cuprea bark. In 1919, Acton, Curjel and Davey found that quinine was a specific for malignant tertian infections, but that in benign tertian infections, although the immediate effects were excellent, a complete cure did not often occur. They found that the total alkaloids, "cinchona febrifuge," were more efficient in curing these relapsing benign tertian cases, and that the curative effect of the total alkaloids was largely dependant on the quinidine content. We have therefore in cinchona bark a number of closely related alkaloids, all of them exerting a destructive action on the malarial parasite, but differing in the degree of destruction. We found that in benign tertian infections, the dextrorotatory alkaloid quinidine was more efficacious than the lævorotatory alkaloid, quinine. As optical activity often conditions the pharmacological action of a drug, these dextrorotatory alkaloids may also be more toxic to lower forms of parasitic life. Hence our attention should be directed to the higher substitution products of cupreidine, optically related to quinidine.

I may here take the opportunity of thanking Messrs. Howards and Co., manufacturing chemists, Ilford, for supplying me with these alkaloids, and Dr. H. H. Blagden, their consulting chemist, for the great trouble he has taken to prepare the various substitution products in a pure state.

THE CINCHONA ALKALOIDS.

Fourteen alkaloids have been isolated from the various species of cinchona; two closely allied alkaloids—cupreine and cupreidine, the former found in cuprea bark (Remijia pedunculata)—are included in this list: they are hydroxycinchonines, and from them the various substitution products (optochin, &c.) can readily be prepared synthetically. The two series of crystallisable cinchona alkaloids—i.e., the natural and the hydro-alkaloids—are responsible for the curative action of cinchona bark in malarial fevers, and will be discussed in this paper.

(*a*) *Natural or Non-hydro-Alkaloids.*

These alkaloids form the bulk of the crystallisable alkaloids in cinchona bark. They possess a vinyl group $CH:CH_2$ in the quinuclidine nucleus.

(1) Cinchonine and its isomeride cinchonidine. $H.C_{17}H_{18}ON_2.CH=CH_2$. Cinchonine is found in small amounts in all the species of cinchona and cuprea bark, and is dextrorotatory. Cinchonidine, its lævorotatory isomeride, is found chiefly in the bark of C. succirubra, officinalis, tucujensis, and lancifolia. The sulphate, owing to its cheapness, is largely used to adulterate quinine.

(2) Hydroxy-cinchonine and its isomeride. $HO.C_{17}H_{18}ON_2.CH=CH_2$. Cupreidine should correspond to cinchonine, but as yet has not been isolated as a pure base. Cupreine, its lævorotatory isomeride, is found in cuprea bark.

(3) Methoxy-cinchonine and its isomeride. $CH_3O.C_{17}H_{18}ON_2.CH=CH_2$. Quinidine is dextrorotatory, and will be shown later to correspond to cinchonine. It is found in all species of cinchona, but especially in C. succirubra, pitayensis, amygdalifolia, and calisaya. Quinine, the lævorotatory isomeride of quinidine, corresponds to cinchonidine.

(*b*) *Hydro-Alkaloids.*

These alkaloids occur in very small quantities in most cinchona barks. They are usually prepared artificially in the laboratory by bubbling hydrogen through the natural alkaloid solution in the presence of platinum or Kelber's nickel. The hydrogenation of the vinyl group $CH=CH_2$ of the natural alkaloid in $CH_2.CH_3$ renders the hydro-alkaloids more stable to oxidising agents.

(1) Hydrocinchonine and its isomeride. $H.C_{17}H_{18}ON_2.CH_2.CH_3$. Hydrocinchonine is dextrorotatory, and hydrocinchonidine is lævorotatory.

(2) Hydro-hydroxycinchonine and its isomeride. $HO.C_{17}H_{18}ON_2.CH_2.CH_3$. Hydrocupreidine is dextrorotatory and is the source of the cupreidine compounds. Hydrocupreine is lævorotatory.

(3) Hydro-methoxy-cinchonine and its isomeride. $CH_3O.C_{17}H_{18}ON_2.CH_2.CH_3$. Hydroquinidine is dextrorotatory, and hydroquinine is lævorotatory.

Amongst these main cinchona alkaloids, we have two series classified according to their optical rotations.

(*a*) The cinchonine series—dextrorotatory alkaloids.

Chemical name and formula.	Name of natural alk. and rotation.	Corresponding hydro-alkaloid $CH_2.CH_3$.
Cinchonine— $H.C_{17}H_{18}ON_2.CH:CH_2$	Cinchonine— $[\alpha]_D + 224{\cdot}4$	Hydrocinchonine— $[\alpha]_D + 189{\cdot}8$
Hydroxycinchonine— $HO.C_{17}H_{18}ON_2.CH:CH_2$	Cupreidine— Not known.	Hydrocupreidine— $[\alpha]_D + 253{\cdot}4$
Methoxycinchonine— $CH_3O.C_{17}H_{18}ON_2.CH:CH_2$	Quinidine— $[\alpha]_D + 243{\cdot}5$	Hydroquinidine— $[\alpha]_D + 265{\cdot}3$

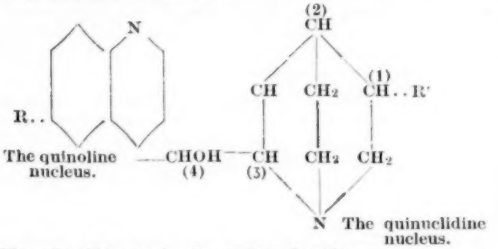
(*b*) The cinchonidine series—lævorotatory isomerides—non-enantiomorphous with the above.

Cinchonidine— $H.C_{17}H_{18}ON_2.CH:CH_2$	Cinchonidine— $[\alpha]_D - 111$	Hydrocinchonidine— $[\alpha]_D - 98{\cdot}4$
Hydroxycinchonidine— $HO.C_{17}H_{18}ON_2.CH:CH_2$	Cupreine— $[\alpha]_D - 175{\cdot}5$	Hydrocupreine— $[\alpha]_D - 148{\cdot}7$
Methoxycinchonidine— $CH_3OC_{17}H_{18}ON_2.CH:CH_2$	Quinine— $[\alpha]_D - 158{\cdot}2$	Hydroquinine— $[\alpha]_D - 142{\cdot}2$

From the hydro-alkaloids of cupreine and cupreidine, the various substitution compounds—viz., ethyl-amyl, propyl, butyl, &c.—can be prepared synthetically.

Isomeric Relationship of Main Cinchona Alkaloids.

The following general formula is now assigned to these cinchona alkaloids :—



Where R = H in cinchonine and cinchonidine.
OH in their hydroxy derivatives—cupreidine and cupreine.
CH_3O in their methoxy derivatives—quinidine and quinine.

R' = $CH : CH_2$ the vinyl group of the natural alkaloids.
$CH_2 . CH_3$ in the hydro-alkaloids.

The alkaloid molecule consists of two parts, the quinoline nucleus on the left and the quinuclidine nucleus on the right; these two nuclei are joined together by a secondary alcohol group CHOH. The alkaloid molecule contains four asymmetrical carbon atoms numbered (1) to (4) in the above constitutional formula. Carbon atom (3) largely conditions the optical activity of these alkaloids, and there should be eight alkaloids with this carbon atom +, and eight enantiomorphous (mirror image) forms, thus giving a total of 16 alkaloids for any of the substituents of R and R' given above.

Since carbon atoms (1) and (2) contribute a positive effect in all the main cinchona alkaloids, the only variation that is possible is in the carbon atoms at (3) and (4). Hence out of a total of 16 possible cinchona-like alkaloids, the number of isomerides is reduced to four, as is shown below :—

Asymmetric carbon atoms—

Dextrorotatory alkaloids.				Lævorotatory isomerides.			
(1 & 2)	(3)	(4)		(1 & 2)	(3)	(4)	
+	+	+	Cinchonine / Cupreidine / Quinidine	+	−	+	(Not known)
+	+	−	(Not known)	+	−	−	Cinchonidine / Cupreine / Quinine

In the reduction of these alkaloids to desoxy-bases, when the CHOH group is replaced by $-CH_2-$ there is a loss of asymmetry at carbon atom (4). These desoxy-bases have still the same sign of rotation as the parent alkaloid, but numerically smaller. Thus :—

Desoxy-cinchonine— $[\alpha]_D + 179$	Desoxy-cinchonidine— $[\alpha]_D - 29{\cdot}9$
Desoxy-quinidine— $[\alpha]_D + 191{\cdot}9$	Desoxy-quinine— $[\alpha]_D - 93$

We have seen that the optical difference between the members of any of these pairs consists mainly in the spatial arrangements of the groups round carbon atom (3), and since the replacement of the asymmetric group $-CHOH-$ by the symmetric group $-CH_2-$ of the desoxy-bases leads in each case to a diminished rotation of the same sign as the parent alkaloid, one can assume, with a fair degree of certainty, that the sign of the contribution of carbon atom (4) to the total rotation is the same as that contributed by the carbon atom at (3). Therefore, in the cinchonine series, all four carbon atoms are dextrorotatory, whilst in the cinchonidine series (1 and 2) are dextrorotatory, and (3 and 4) lævorotatory. The enantiomorphous (mirror image) forms of either group are at present not known.

From the chemical and optical relationship one would therefore expect a greater similarity in the pharmacological action towards living tissues between the different members of the cinchonine series rather than with the members of the cinchonidine series. That such a relationship exists between optical activity and pharmacological action I will now demonstrate.

Pharmacological Action.

In a paper read before the Therapeutical Section of the Royal Society of Medicine the results of my researches were given in detail. Here it is only necessary to give a brief summary of those results. These alkaloids were tested as follows: (*a*) Toxicity; (*b*) on digestive enzymes; (*c*) local effects on tissues; (*d*) effects on the blood and blood pressure.

Toxicity can be determined for mammals, protozoa, and bacteria. We can therefore approximately arrive at (1) the safe dose for man by tests on other animals, (2) the toxicity for lower forms of life by studying their action on protozoa and bacteria.

TABLE I.

Showing the relative toxicity of the different cinchona alkaloids, when injected intravenously and intermuscularly. The dose is calculated as milligrammes per gramme of mouse. The minimum certain lethal dose only is given.

Dextrorotatory Cinchona Alkaloids.			Lævorotatory Isomerides.		
—	Intravenous dose.	Intermuscular dose.	—	Intravenous dose.	Intermuscular dose.
(A) Nat. alk.—	In mgs. per g. of mouse.		(A) Nat. alk.—	In mgs. per g. of mouse.	
(1)	0·085	0·2475	(6)	0·12	0·36
(2)	0·09	0·255	(7)	0·13	0·39
(B) Hyd. alk.—			(B) Hyd. alk.—		
(3)	0·08	0·32	(8)	0·1	0·3
(4)	0·0825	0·33	(9)	0·12	0·36
(5)	0·045	Alive at 0·135	(10)	0·13	0·39

Dextrorotatory cinchona alkaloids.—(A) Natural alkaloids: (1) Cinchonine; (2) quinidine. (B) Hydro-alkaloids: (3) Hydrocinchonine; (4) hydroquinidine; (5) ethyl hydrocupreidine.

Lævorotatory isomerides.—(A) Natural alkaloids: (6) Cinchonidine; (7) quinine. (B) Hydro-alkaloids: (8) hydrocinchonidine; (9) hydroquinine; (10) ethyl hydrocupreine.

Mammals.—The mouse was used in these tests for convenience and economy. The standard solutions containing 1 per cent. anhydrous base dissolved in the requisite amount of N/HCl to form bihydrochlorides, were injected intravenously and intermuscularly into these rodents. I am indebted to Miss F. M. Durham and Mlle. J. E. Marchall for the help they gave me in doing these tests. The intermuscular injections were given into the thigh muscles, as multiples of the intravenous lethal dose. Table I. gives the result of these tests and shows that on mice :— (1) The dextrorotatory alkaloid "cinchonine series" are all more toxic than "the cinchonidine series"; (2) the hydro-alkaloids are all more toxic than the corresponding natural alkalcids; (3) the lethal intermuscular dose is about three times that of the intravenous dose.

Protozoa.—The ciliate used throughout these tests was *Paramecium caudatum*, kindly cultivated for me by Mr. Clifford Dobell, F.R.S., from a single individual. This was done to exclude the possibility of variations in resistance due to mixture of different races in the same culture. I am dealing with "the behaviour of *Paramecium caudatum* towards the cinchona alkaloids' in a separate paper. The main conclusions affecting these tests were as follows :— 1. The variations seen in the dose and death time, when tested against the same alkaloid, are due to the alterations in the hydrogen-ion concentration of the cultures. 2. The amount of CO_2 present in the cultures and produced by paramecium or bacteria is the main cause for the differences in pH of these cultures. Thus a deep culture with a small air surface slowly becomes more and more acid, whilst a shallow culture with a large surface exposed to air in a very short time loses its CO_2 and becomes alkaline. 3. The death-time test is a bad test, as the death time is very short in alkaline cultures, and takes hours in acid media. 4. The minimum lethal concentration, varies with the pH of the culture, but is the better test.

Technique.—In a series of 12 or more test-tubes, 1 c.cm. of the different concentrations of the test alkaloid was placed in each. The range of concentrations extended from 1–1000 to 1–500,000 of anhydrous base. 1 c.cm. of a thick paramecium culture was added to each tube, making the final concentrations range from 1–2000 to 1–1,000,000. The pH of the culture is taken by the method devised by H. H. Dale and Lovatt Evans (1920). Next day, 20–24 hours later, each test-tube is shaken, and its contents poured out into a 2 c.cm. live chamber, and examined with a low-power objective. I am greatly indebted to Dr. Lovatt Evans

of the National Research Institute, for his help and advice in finding out the cause of these variations.

The first test was done on a paramecium culture with a pH of 7·25, and the results are shown in Table IIA. In this test cinchonine and hydrocinchonine were the least toxic; ethyl hydrocupreidine the most toxic, and ethyl hydrocupreine the next toxic. No difference could be made in the relative toxicity of quinidine, cinchonidine, and quinine. The hydro-alkaloids were all slightly less toxic than the corresponding natural alkaloid.

TABLE IIA.

Showing the relative toxicity of the different cinchona alkaloids, when tested on a paramecium culture of (A) pH 7·23, and (B) pH 7·79.

CINCHONINE SERIES.			CINCHONIDINE SERIES.		
—	Amount of anhydrous base.	Equivalent concentration.	—	Amount of anhydrous base.	Equivalent concentration.
	mgs. per c.cm.			mgs. per c.cm.	
(1)	0·3	1–3,000	(6)	0·1	1–10,000
(2)	0·35	1–2,800	(7)	0·1	1–10,000
(3)	0·1	1–10,000	(8)	0·1	1–10,000
(4)	0·15	1–7,000	(9)	0·15	1–7,000
(5)	0·025	1–40,000	(10)	0·035	1–28,000

TABLE IIB.

As above, when tested on a paramecium culture of pH 7·79.

(1)	0·25	1–4,000	(6)	0·02	1–50,000
(2)	0·25	1–4,000	(7)	0·035	1–28,000
(3)	0·01	1–100,000	(8)	0·025	1–40,000
(4)	0·015	1–68,000	(9)	0·035	1–28,000
(5)	0·0045	1–220,000	(10)	0·015	1–68,000

Cinchonine series.—(1) Cinchonine; (2) hydrocinchonine; (3) quinidine; (4) hydroquinidine; (5) ethyl hydrocupreidine. *Cinchonidine series.*—(6) Cinchonidine; (7) hydrocinchonidine; (8) quinine; (9) hydroquinine; (10) ethyl hydrocupreine.

The next test was done on a culture which was more alkaline—i.e., pH 7·79 (Table IIB.). We therefore see that these alkaloids kill in much weaker concentrations when the culture is alkaline, but the order of relative toxicity is maintained. In the acid culture pH 7·23, largely owing to the coarser gradations—i.e., between 1–5000, 1–10,000, 1–20,000 concentrations, that were put up at these stronger concentrations—no difference in toxicity was seen between quinidine, quinine, and cinchonidine. In alkaline culture, with finer gradations at the weaker concentrations, the order of relative toxicity was quinidine, cinchonidine, quinine.

Conclusions.

(1) The toxicity of the cinchona alkaloids on paramecium varies with the pH of the culture. They are much more toxic in alkaline than in acid cultures.

(2) With the exception of cinchonine, the dextrorotatory alkaloids in alkaline culture are more toxic than the "cinchonidine series."

(3) The toxicity increases with the higher members of the series.

(4) The hydro-alkaloids are slightly less toxic than their corresponding natural alkaloids.

TABLE III.—*Relative Bactericidal Action of Quinine Derivatives.*

—	Diph. bacillus.	Tetanus bacillus.	Strepto-coccus.	Staphy-lococcus.	Pneumo-coccus.
Quinine hydrochlor	1–10	1–1,000	1–1,000	1–500	1–2,000
Ethyl hydrocupreine	1–400	1–2,500	—	1–500	1–400,000
Iso-propyl-hydrocupreine	1–800	—	1–8,000	1–1,000	1–200,000
Iso-amyl-hydrocupreine	1–2000	1–20,000	1–40,000	1–8,000	1–20,000
Heptyl hydrocupreine	1–8000	—	—	1–64,000	—
Iso-octyl-hydrocupreine	1–8000	1–60,000	1–80,000	1–16,000	—

Bacteria.—Unfortunately I have not had sufficient time to investigate the action of the cinchonine series on the different pathogenic bacteria. The action of ethyl hydrocupreine (optochin) is well known on the pneumococcus, of iso-octyl-hydrocupreine (Vuzin) on suppurative processes, whilst Michaelis regards iso-amyl-hydrocupreine as a specific for Vincent's angina. Table III. is taken from Prof. Dixon (1920).

The investigation of the cinchonine derivatives—i.e., from hydrocupreidine—offers great possibilities as regards their action on bacteria and protozoa, as they are distinctly more toxic to mice and paramecium than the cupreine series.

Action on Digestive Enzymes.

MacGilchrist (1911), in an able paper on the methods of administering quinine, came to the conclusion that the oral method was the best for all practical purposes, and the alkaloid was very rapidly absorbed when given on an empty stomach. His work is now universally recognised, and the intermuscular and intravenous methods are reserved for certain selected complications. On the other hand, further work was required on the action of the different cinchona alkaloids on the digestive ferments in order to explain the gastric disturbances so commonly seen after taking large doses of quinine, and to anticipate what may happen if these alkaloids were ingested by the mouth. Their action was therefore studied on:—

Ptyalin.—This ferment is very sensitive to the reactions of the substrate; the acidity produced by the acid salts of these alkaloids would be sufficient completely to inhibit the digestion of starch. The bases of these alkaloids were therefore tested, and one found that the inhibition seen was due largely to a deficiency of alkali in the weaker dilutions. As the digestion of starches by ptyalin is very rapid (10–30 min.), no appreciable interference with starch digestion would occur if the alkaloids were given half an hour after a meal.

Pepsin.—The inhibition produced on the digestion of 50 mg. of Congo Red fibrin (Roaf, 1919), 5 c.cm. of a 0·2 per cent. pepsin in 0·1 per cent. HCl, by concentrations of 0·1 to 0·5 per cent. of these alkaloids was tested with the following results: (1) The degree of inhibition produced by these alkaloids is dependent on the concentration present; (2) the cinchonine series inhibit peptic digestion more than the cinchonidine series; (3) the inhibition is less when the ferment first attacks the protein than when the protein is first permeated with the alkaloid; (4) the mono-salts use up the free HCl acid, and by reducing the acidity further hinder gastric digestion.

Trypsin.—As the acid contents of the stomach are neutralised in the duodenum by the alkalinity of the bile and pancreatic juice, the acid salts of these alkaloids are therefore precipitated as bases. It was thus necessary to test the action of (1) the base, and (2) the acid salts of these alkaloids on tryptic digestion. The results were as follows: (1) That quinidine base had a more powerful effect in inhibiting the tryptic digestion of Congo Red fibrin than quinine base; (2) the inhibition was dependent on concentration, and the cinchonine series were more powerful than the cinchonidine series; (3) the inhibition was more marked when the alkaloid was first allowed contact with the fibrin.

Erepsin.—Dr. H. W. Dudley, biochemist at the National Research Institute, Hampstead, kindly estimated the amount of amino-nitrogen in these tubes by the Van Slyke's method, and I am indebted to him for all the help he gave me during the testing of these alkaloids on the digestive ferments. The result showed that in the presence of a 1–5000 quinine or quinidine base, a 10 per cent. inhibition occurred in the digestion of peptones by erepsin.

Action on Intestinal Muscle.

It was necessary to see what action these alkaloids had on intestinal muscle in order to explain the cause of the attacks of diarrhœa so frequently seen amongst patients undergoing courses of quinine treatment when large doses are given. A piece of intestine, about 1 in. long, was taken from a freshly-killed rabbit, washed clean in Tyrode's solution, and tested in the uterine bath devised by Dale and Laidlaw. Concentrations of 1–10,000 and 1–20,000 of the different alkaloids were tested—i.e., dilutions much stronger than could occur in the body. The only effect seen was a slight increase in the amplitude of the contractions, with a slowing of the rhythm.

Summary of the Action of these Alkaloids.

(1) The cinchonine series have a greater inhibitory action on the digestive enzymes than the cinchonidine series.

(2) The inhibition is most with trypsin, less with pepsin, and feeble with erepsin. If these alkaloids were given half an hour after a meal they would not interfere with ptyalin digestion.

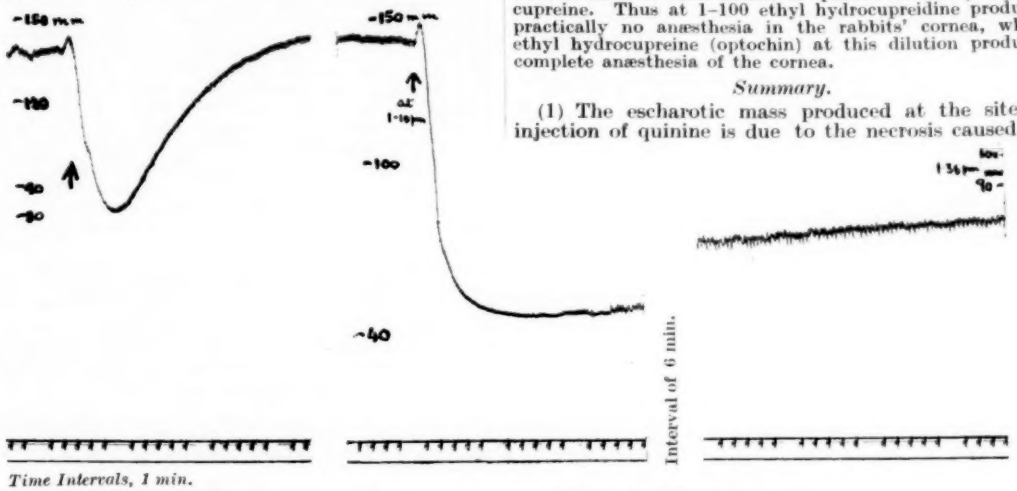
(3) The stronger the concentration, the greater is the inhibition produced by these alkaloids. Therefore, unnecessarily large doses should be avoided, and the alkaloid should be given well diluted.

(4) The inhibition is less when the ferment is first allowed to attack the protein than when the protein is allowed to be first impregnated with the alkaloids. Therefore, these alkaloids should always be given after a meal.

(5) The mono-salts—e.g., commercial sulphates—should always be given with acids, as they use up the free HCl in the stomach, and thus further inhibit peptic digestion. In pill form, the bihydrochloride or bisulphate should always be prescribed.

(6) Any inhibition occurring in peptic digestion leads to a deficiency in the formation of peptones. Therefore these alkaloids should be given at the end of peptic digestion—i.e., half an hour to two hours after a meal.

(7) These alkaloids increase the amplitude and slow the rhythm of intestinal muscle. The diarrhœa observed is probably due to an interference with digestion, both in the stomach and intestines, and not to its action on intestinal muscle.



Time Intervals, 1 min.

10 mg. of hydroquinine. 10 mg. of hydroquinidine.

Cat. 2300, female. Ether. Vagi intact. Shows the effect of 10 mg. injected intravenously.

(c) *Local Effects on Tissues.*

When strong solutions of acid salts of quinine are injected deep into the tissues of the body, various local effects can be observed :—

On Muscle and Connective Tissue.—The local necrosis produced at the site of inoculation and the surrounding zone of hyperæmia is due to the effect of these strong acid solutions—i.e., the acidity of 0·5 g. of bihydrochloride dissolved in 1 or 2 c.cm. of water. The acidity of these solutions is rapidly neutralised by the alkalis of the tissue, but not sufficiently quickly to prevent damage and irritation to the muscles and connective tissue at the site of inoculation. When neutralisation has occurred, quinine is precipitated in situ as a white flocculent precipitate of quinine base. The result is that a white escharotic mass is seen at the site of injection, consisting of necrosed tissue, into which quinine base is precipitated. The bases of these alkaloids do not possess any escharotic action, and we may safely conclude that the necrotic action is due to the strong acidity of these solutions, and not to the alkaloid. These bases are very insoluble in water, but soluble in certain oils and petroleum. A method may possibly be devised to avoid these local necrotic effects by injecting the base dissolved in one of these substances.

On Leucocytes.—Semple (1910) considered that the leucocytes could carry tetanus spores from the intestines or from surface wounds and deposit them in the necrotic area produced by the quinine injections. His views are diametrically opposed to the practical experience of giving these injections for a number of years to malarial patients. There can be no doubt that tetanus occurring after a quinine injection is due solely to faulty technique. Dr. L. Colebrooke, of the National Research Institute, kindly performed these tests for me in order to see in what dilutions these various cinchona alkaloids would prevent leucocyte migration. The details of the technique are given in Wright and Colebrooke's new edition of "The Teat and Capillary Pipette." The results of these tests are given in a table which shows that the migration of leucocytes is completely inhibited at dilutions of 1–500, and completely or partially at 1–1000. In other words, as long as the alkaloid was not absorbed from the site of inoculation no leucocytes would enter the area.

Whilst in India in 1919 I tested this point by injecting rabbits with non-lethal doses of quinine. The animals were killed on the first to the tenth day after injection. Twenty-four hours before death they were injected intravenously with diamine B.B. after the method of Goldschmidt. This intravitam method stains the migratory cells. Sections of these necrotic areas were made and examined. One found that the muscle fibres were necrosed, and that the whole of the repair was done by the fibroblasts of the endomysium, and there was a complete absence of any leucocytes or other migratory cells.

Anæsthetic Effects.—W. E. Dixon (1920) discussed the local anæsthetic effects of the various substitution products of cupreine, and showed that the higher members of this series had powerful local anæsthetic action. I tested cinchonine and ethyl hydrocupreidine and found that both were inferior in their action to quinine and ethyl hydrocupreine. Thus at 1–100 ethyl hydrocupreidine produced practically no anæsthesia in the rabbits' cornea, whilst ethyl hydrocupreine (optochin) at this dilution produced complete anæsthesia of the cornea.

Summary.

(1) The escharotic mass produced at the site of injection of quinine is due to the necrosis caused by the strong acid solutions and the quinine being precipitated a white flocculent ppt. of base.

(2) A negative chemotaxis of leucocytes occurs as long as the alkaloids remain at the site of inoculation and are not absorbed.

(3) The cinchonine series, so far tested, are less anæsthetic on the rabbits' cornea than the cinchonidine series.

(d) *Effects on Blood and Blood Pressure, &c.*

Quinine is usually injected into the veins in the form of a bihydrochloride in fairly strong solutions—i.e., ½ g. of bihydrochloride dissolved in 5–10 c.cm. of water—which is distinctly acid. In the blood quinine can only circulate in the form of a base—i.e., an alkali. The injection of acid salts into the circulation is therefore wrong from a physiological point of view. The following effects were therefore studied :—

Effect on Red Blood Cells.—It is well known that the acid salts of quinine are hæmolytic, and much has been made by the advocates of the quinine-blackwater fever theory in suggesting that quinine is the cause of blackwater fever. As far as I know no work has been done on quinine base as regards its hæmolytic properties. The following experiments will show that the acid salts are hæmolytic, but the base is not :—

Goat's blood was defibrinated and washed free of serum. A dilution of 1 in 25 was made of these washed corpuscles in normal saline.

Quinine base is only soluble in 1–2000 normal saline, and to show that no hæmolysis occurred at this dilution, 0·4 c.cm. of washed corpuscles was added to 10 c.cm. of a

1–2000 solution of quinine and quinidine base, and incubated at 37° C. for 24 hours. The solutions were without a trace of hæmolysis.

(1) Quinine bisulphate. (2) Quinine base.

	1–200	1–2000	1–4000	1–8000	1–16,000
(1) ..	CH	CH	PH	FH	Nil.
(2) ..	—	Nil.	Nil.	Nil.	Nil.

CH = Complete hæmolysis. PH = Partial hæmolysis
FH = Faint hæmolysis.

In some experiments done for me by Major H. C. Brown, C.I.E., of the Wellcome Laboratory, it seemed that the base of quinine and quinidine slightly hindered the action of anti-sheep amboceptor when acting on goat's corpuscles. The injection of strong acid solution into the blood causes a considerable amount of hæmolysis, and there can be little doubt that it is the cause of the rigors so commonly seen a few hours after these intravenous injections; 0·1 g. of anhydrous base is dissolved in 29 c.cm. of N/HCl and made up to about 150 c.cm. with distilled water. The acid is then exactly neutralised with 29 c.cm. of N/NaOH, and made up to 200 c.cm. This solution is then a 1–2000 solution of base in normal saline, the sodium chloride being formed by the interaction of the HCl and NaOH. This solution can be boiled without the quinine being converted into quinotoxin, as occurs when heating acid solutions of this alkaloid. A much smaller dose of anhydrous base 0·25 g. injected in this manner will probably be as effective as 0·5 g. of bihydrochloride. As quinine base is not hæmolytic, the advocates of the quinine-blackwater theory will now have to turn their attention to the various decomposition products of this alkaloid.

Effect on Blood Pressure.—The fall of blood pressure that occurs after the intravenous injection of quinine is well known, and has been the subject of numerous papers. As I have been advocating the use of quinidine in benign tertian intections, it was necessary to know what effect this alkaloid would have in producing a fall of blood pressure. Dr. H. H. Dale, F.R.S., kindly tested the effect of these various alkaloids for me on the blood pressure of cats. The following are the main conclusions: 1. The depressor effect was greater in all the "cinchonine series" (most marked in quinidine), and took longer to wear off than the cinchonidine series. 2. The depressor effect produced by the injection of 1 mg. of quinidine was equal to that produced by 10 mg. of quinine. Therefore this will be a danger in the intravenous administration of quinidine in the young, feeble, or in large doses.

The graph shows the difference in the fall of blood pressure produced by the intravenous injection of 10 mg. of hydroquinine and hydroquinidine. The action on uterine muscle is included under the systemic effects for convenience. The action of these alkaloids was tested on the excised guinea-pig's uterus. The following are the main conclusions:—

On Virgin Uterus.—(1) In weak solutions (1–75,000) all the cinchona alkaloids increase the amplitude of the uterine contractions. In stronger concentrations (1–20,000) they depress both the amplitude and rhythm. (2) The cinchonine series cause a greater effect on the amplitude and rhythm than the cinchonidine series. (3) The hydro-alkaloids are more powerful in this respect than the natural alkaloids.

On Multiparous Uterus.—The behaviour is very similar to that above, but the muscle is more sensitive and irregular in its action to these stimuli.

On Pregnant Uterus.—I am dealing with the effects of quinine in a separate paper, but the main conclusions were:—(1) That the action of quinine depends upon the concentration of the base; thus with strong concentrations (1–40,000) the uterus is thrown into a high state of tonus; with weaker concentrations (1–100,000) the intermittent uterine contractions are increased; and with still weaker concentrations (180,000 and under) have no effect on the contractions. (2) That quinine causes contraction of both the longitudinal and circular fibres.

Miscarriage will therefore only be caused (*a*) by large doses, almost sufficient to poison the patient, when the uterus will be thrown into a persistent state of tonus which would lead to death of the fœtus or rupture of the membranes; (*b*) by large doses (20–40 gr.), increasing the force of the intermittent uterine contractions, to cause rupture of weak membranes or dilatation of an already open or patulous os. Ordinary medicinal doses, 5–10 gr., in a healthy woman would have no effect on the uterine contractions, as we already know from clinical experience.

Factors on which the Pharmacological Action of These Alkaloids Depend.—As far as can be reasoned from this study, the pharmacological action of these cinchona alkaloids is dependent on three factors in the complex alkaloidal molecule:—

1. The grouping of the quinuclidine system around the asymmetrical carbon atom at (3) as shown by their optical rotation. The dextrorotatory alkaloids, "cinchonine series," are more powerful in their effects in toxicity on mice and paramecium, on inhibiting the action of enzymes, on blood pressure and uterine muscle than the lævorotatory alkaloids of the "cinchonidine series." The cinchonidine series are more powerful in their local anæsthetic effects.

2. The vinyl group ($CH:CH_2$) in the quinuclidine system. The natural alkaloids are slightly more toxic to paramecium than the hydro-alkaloids. The hydrogenation of the vinyl group to $CH_2.CH_3$ in the hydro-alkaloids renders these alkaloids more difficult to oxidise, and they are accordingly not so easily broken down by the body tissues. They are more toxic to mice, inhibit enzyme action, and cause a greater fall of blood pressure and uterine contraction than the natural alkaloids.

3. The group occupying position (6) in the quinoline ring. The higher members of both series of the hydro-alkaloids are more toxic to mice, paramecium, bacteria, and leucocytes, and are more powerful as local anæsthetics. This action is not maintained on blood pressure, uterine muscle, and inhibition of enzyme action.

We can therefore conclude that (1) The dextrorotatory alkaloids, "cinchonine series," are more powerful than their lævorotatory isomerides, the "cinchonidine series": (2) the hydro-alkaloids are more stable and more active in many respects than the natural alkaloids; (3) the higher members of both series of these alkaloids are more toxic to mammals, protozoa, and bacteria than the lower members.

These results are the effects produced on the various living tissues, and give the direction in which future research should follow. The parasiticidal action of these alkaloids on the malarial parasite can only be arrived at by direct observations on malarial patients.

A CASE OF LATERAL SINUS THROMBOSIS.

BY LESLIE B. C. TROTTER, M.A., M.D. CAMB.

THIS case of lateral sinus thrombosis, probably due to acute pyorrhœa and alveolar abscess, presents points that seem to me to be of sufficient interest to be placed on record. The patient recovered.

W. P., was a well-built farm labourer, aged 35. For some days before the onset of any symptoms he had been busy hay-making in a very hot sun. On June 27th he began to complain of severe headache and giddiness, associated with pain in and in front of the right ear. On the 28th, when he was first seen, there was some swelling in front of the ear, with redness and tenderness, but nothing abnormal behind the ear and no otorrhœa. The teeth were all more or less decayed, and the gums were swollen, red, and purulent. Temp. 100° F., pulse 120 per minute. Hot boric fomentations were prescribed, a purge, rest in bed, and a milk diet.

Patient was next seen in response to an urgent message on June 30th at 4 P.M. The swelling in front of the ear had subsided; up to 1 A.M. he had complained of violent headache and sweating, and at that time he had a severe rigor; he then suddenly felt better and slept heavily for 12 hours. On waking up he had another rigor and vomited just before he was seen the second time. His state on the latter occasion was: Temp. 102°, pulse 120, acute generalised headache, no pain or tenderness over the mastoid, and no eversion of the ear; very slight discharge from the ear. The swelling in front of the ear had subsided, but there was some slight tenderness behind the angle of the jaw (right side). The face was slightly cyanosed.

Diagnosis.—In view of the extreme heat of the weather there was always the possibility of sunstroke, but the otorrhœa, preauricular swelling, tenderness behind the angle of the jaw, and cyanosis had to be accounted for. A diagnosis therefore was made of "acute otitis media (due to oral sepsis) and lateral sinus thrombosis."

Patient was at once sent to the Cottage Hospital, Ledbury. On July 1st he felt and appeared much better in the morning and it was decided to postpone operation. In the evening he complained of headache, and had a temperature of 99°. On the 2nd in the morning patient had a rigor and vomited. Temp. 100·6°, pulse 88. In view of developments further delay was decided against, and arrangements were made for operation.

Operation.—After a hypodermic injection of 1/100 gr. of atropine, patient was anæsthetised by Dr. T. A. Jones with C.E.2 mixture. First step: An incision was made about 4½ in. long over the anterior border of the sterno-mastoid on the right side, and the internal jugular vein (which was quite empty) tied with a double ligature of stout catgut below the common facial junction, opposite the bifurcation of the common carotid. A gauze wick 1 in. wide was inserted down to the vein, and the incision sutured (save for ½ in. at the lower end) with silkworm gut. A sterile gauze dressing was then applied. Second step: A curved incision was made behind the ear and the mastoid antrum opened. There was no sign of pus, so the bone was partly chiselled and partly gouged away down to the lateral sinus. Directly this was reached a quantity of very foul, blackish liquid pus welled out. The opening in the bone was sufficiently enlarged to admit the little finger-end and the bone bevelled away to ensure free drainage. A quantity of breaking-down blood clot was removed from the lateral sinus, and the cavity washed out with hydrogen peroxide. In view of the patient's grave condition the middle ear was not touched. A drainage-tube was inserted into the lateral sinus, and the wound lightly packed with iodoform gauze. A plain sterile gauze dressing was then applied. Total duration of operation was 1½ hours.

Progress.—Patient's condition steadily improved. On the 5th he was put out on the balcony and remained there night and day. The discharge from the wound was extremely foul for a long time in spite of frequent dressings. From the 10th to the 14th the temperature continued to fall, being subnormal all the time. At the same time patient complained of persistent bad headache (generalised over the top of the head) and vomited practically everything. Feeding became difficult; ½ drachm doses of bicarbonate of soda with minim doses of dilute hydrocyanic acid 4-hourly did not have much effect. He was then given ½ oz. doses of champagne every hour and the vomiting ceased in a few hours. On the evening of the 15th, in view of acute headache and a temperature of 102°, associated with a pulse-rate of only 118, an exploring needle attached to a small glass syringe was inserted into the posterior fossa through the inner wall of the lateral sinus, the needle being directed downwards, backwards, and inwards. About 1 c.cm. of turbid serum was withdrawn. No pus was found. A quarter of an hour afterwards the headache ceased abruptly.

On the 14th, 24 hours before the posterior fossa was explored, patient began to be troubled with a copious discharge of pus in the naso-pharynx, which interfered seriously with deglutition, but cleared up in about a week under treatment with a nasal douche and gargle composed of a weak alkaline antiseptic. On the morning of the 16th an incision was made in the wall of the lateral sinus with a fine scalpel on the site of the needle puncture. This opening was kept patent with a gauze drain. The relief of pressure in the posterior fossa on the night of July 15th and the incision of the dura next day marked the turning-point. From this time onwards patient progressed steadily. Temperature dropped to normal or subnormal, all vomiting and headache ceased, and he began to take solid food in satisfactory quantities. On August 16th patient had recovered sufficiently to have his teeth dealt with; they were all removed by Mr. A. Moore. Thereafter the cleaning up of the posterior fossa and lateral sinus was remarkably rapid.

Patient was discharged from hospital on the 29th and by the 31st the wound had completely healed. He has no vertigo or headache, and feels fit for work in spite of a very slight discharge from the ear every night.

There seems to be no doubt that the origin of the sepsis was an acute exacerbation of pyorrhœa due primarily to carious teeth. A septic phlebitis was probably started in the pharyngeal veins, which in turn gave rise to the inflammatory swelling in the parotid region before causing trouble in the internal jugular. The phlebitis in the jugular was followed by an ascending thrombosis, which later involved the lateral sinus. It seems quite likely that the slight discharge from the meatus seen on June 30th came from the parotid swelling direct, and not at that time from the middle ear. The opening of the common facial vein must have been occluded by clot in the jugular, as the latter was quite empty at the site of ligation. The purulent discharge in the naso-pharynx probably arose from an abscess of similar origin—i.e., septic phlebitis, which burst spontaneously. The middle ear and the posterior fossa no doubt became infected later by direct continuity from the lateral sinus.

My thanks are due to Mr. Wilfred Trotter for his helpful advice, to my partner Dr. Jones, and to Miss Holford, the matron of the Ledbury Cottage Hospital, for her highly efficient care of the patient.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

A MEETING of this section was held on Jan. 13th, Dr. JAMES TAYLOR, the President, in the chair.

Exhibition of Cases and Specimens.

Mr. P. G. DOYNE showed for diagnosis a female child aged 4 months exhibiting swellings, to the outer side of the limbus in each eye, which had been present since birth. Other congenital defects exhibited by the child were a bifid tongue and three phalanges in the right thumb. The diagnosis lay between dermoid and subconjunctival lipoma. In the discussion which followed the opinion was generally expressed that the swellings were probably dermoids. It was suggested that X ray photographs should be taken to determine the position of the epiphyses.

Mr. M. S. MAYOU exhibited a case of

Osteomyelitis of the Upper Jaw

in a child who, at the age of 6 months, suffered from an extremely painful swelling of the eyelids attributed to an insect bite. An incision was made by the family practitioner parallel to the lower margin of the orbit and a quantity of pus evacuated. Some days later the child was brought to hospital, where it was treated for two months, and was finally discharged with the sinus unhealed. A piece of bone had exfoliated recently, and it was hoped that the sinus would now heal. A second case, also an infant, was admitted to the same hospital with extreme swelling of the right eye, especially of the lids, which were red and œdematous and very tender. What could be seen of the eyeball on separating the lids was apparently normal, although the eyeball as a whole was thrust forward. The child was extremely ill, temperature 104° F. and pulse 140. Several days before admission an abscess in the hard palate had been incised by the general practitioner, but this had healed completely at the time of admission. An incision parallel to the lower border of the orbit carried down to bone liberated a quantity of pus. An immediate improvement occurred in the child's condition, the temperature falling to normal in about a week. A sinus persisted until the child was discharged from hospital six weeks later, but was now healed. Mr. Mayou said that in his first case of this sort, which occurred in 1901, practically the whole of the upper jaw came away as a sequestrum. Nearly all the recorded cases of orbital cellulitis had been due to osteomyelitis of the upper jaw in infants under 1 year old. The route of infection was difficult to understand, as the child rarely had any teeth: he did not believe that it came from the nose, as the ethmoidal cells were not developed. Probably the infection was metastatic, as in osteomyelitis of the long bones.

Mr. LESLIE J. PATON said that he had had a very similar case in a child 4 months old. On making an incision fully an ounce of pus escaped, and a probe detected bare bone. No bone was exfoliated in this case. The sinus eventually closed, leaving remarkably little disfigurement.

Mr. HUMPHREY NEAME exhibited a case of

Congenital Abnormality

branching remnants of persistent hyaloid vessels. The patient, a female aged 66 years, had noticed mistiness and "black spots" in the right eye for several years. Vision in the right eye with a correction was 6/36, and in the left 6/9. The right fundus exhibited a number of floating strands in the vitreous arising by a single stalk from the disc. These had no attachment to the lens.

Miss IDA MANN described briefly the development of the hyaloid artery, showing drawings made from serial sections of the eye of the human fœtus at five weeks. The hyaloid artery generally appeared

to break up into five main branches after emerging from the disc. This was particularly interesting as Mr. Neame's case exhibited five branching filaments.—Mr. LESLIE PATON suggested the possibility that the case was one of proliferative retinitis rather than persistent hyaloid artery, since a number of pathological changes, including hæmorrhages, were also present.—In reply Mr. NEAME said that he thought the spray was too localised for the condition suggested by Mr. Paton.

Mr. R. LINDSAY REA showed a case of filamentary keratitis; the corneæ were now practically anæsthetic.

Mr. B. T. LANG exhibited a new operating lamp for ophthalmic work. This lamp had a "daylight screen," the use of which enabled the operator to see colours such as that of fluorescin.

Mr. MALCOLM HEPBURN read a paper on

Experiences Gained from 140 Trephine Operations for Glaucoma.

He described in detail the technique of the operation which he usually employed, laying particular emphasis on the importance of preserving as thick a conjunctival flap as possible to obtain, in order to avoid subsequent infection. He showed how at various stages of the operation the conjunctiva might be wounded, and pointed out various precautions which must be taken to prevent such an occurrence. He discussed the various complications known to have occurred after trephine operations, such as button-holing the conjunctival flap, loss of the disc, vitreous loss, delayed re-formation of the anterior chamber, lens opacities, and detachment of the choroid, and showed in what way they influenced the prognosis. He referred to the subject of "late infection," which in the opinion of some surgeons was one of the dangers to be anticipated after trephine, and mentioned that in his experience this complication was extremely rare. His experience led him to the conclusion that the trephine operation was contra-indicated in eyes where the tension was raised at the time of the operation, in secondary glaucoma due to any cause, and that less favourable results might be expected in cases of buphthalmos, and in those cases where the history had been of long duration with serious deterioration of vision, accompanied by generally contracted fields down to the fixation point. He regarded the operation as an ideal one for chronic glaucoma of all kinds, especially that found in young adults; and he advocated the operation of scleral trephine as soon as possible after definite symptoms had manifested themselves.

Mr. R. CRUISE said that his experience of the trephine operation had been disastrous. He had at one time performed the operation, so ably advocated by Mr. Hepburn, until he had had the misfortune to cause vitreous to escape in two cases. In one case, in order to preserve the vitreous, he sealed the trephine hole with a cautery, with the result that the eye became blind. He had also had two cases of infection following the operation, both of which cleared up although vitreous opacities remained. In another case the conjunctival flap developed a sort of keloid condition. The operation he now performed, the "flap-sclerotic," he had found uniformally satisfactory, and he considered it safer than the trephine operation, which often left only a thin pellicle between the external air and the interior of the eye.

Mr. MAYOU agreed with Mr. Cruise, and said he had frequently seen the thin pellicle described by Mr. Cruise. Mr. Hepburn's figures for detachment of the choroid were surprisingly low; one authority placed this complication (often in minor degree) as high as 75 per cent. of all trephine cases, as proved by routine examination with a contact illuminator.

Mr. B. T. LANG thought the danger from button-holing the conjunctival flap had been much exaggerated. He had seen one case, where a direct communication existed between the interior of the eye and the external air, develop conjunctivitis without any serious consequences following. Nevertheless, he personally preferred the Lagrange operation.

Mr. HEPBURN, in reply, said that he could only suppose that Mr. Cruise had had extraordinarily ill-fortune in his trephine operations. The thin pellicle, which some speakers had criticised, he had observed to thicken in time.

Mr. HUMPHREY NEAME read a paper on

Epibulbar Sarcoma with Penetration of the Globe.

In May, 1919, a patient, F. B., had noticed a swelling under the upper lid of the left eye. There was a history of syphilis, recent ulceration of the palate, deformity of the nasal bones, and a positive W.R. For a considerable time the swelling was considered to be a gummatous infiltration, but as it failed to react to anti-syphilitic treatment, and as the eye was practically blind eventually, Sir John Parsons, who had charge of the case at the Royal London Ophthalmic Hospital, decided to enucleate the eye. Pathological examination revealed an extensive epibulbar growth with extension within the globe. The growth surrounded the cornea and as a thin sheet spread around the eye to the posterior pole. The iris, ciliary body, and choroid were completely infiltrated with the same type of growth. Microscopically, the growth was a round-celled sarcoma with a slightly alveolar formation. Within three months of the date of enucleation there was a recurrence within the orbit and exenteration of the orbit was carried out by Sir John Parsons. There was a mass of round-celled recurrent growth not definitely delimited from the orbital tissues. The stump of the optic nerve, in transverse section at the posterior limit of the growth, was free from growth cells.

The outstanding feature of this case was that there had apparently been an extra-bulbar sarcoma with extension within the globe—an extremely rare condition. Less rarely sarcoma started in the choroid and extended out through the coats of the eye, usually by the perivascular lymphatics of the various perforating vessels. There seemed to be more evidence in favour of an extra-bulbar origin of the growth in this case than of an intra-bulbar. The main points in this evidence were: (1) The earliest symptoms of which the patient complained were referred to the epibulbar region above the cornea. (2) The vision, as tested within two months of the first symptoms, was found at Moorfields Hospital to be 6/6 with the appropriate glass in the left eye. The patient did not notice any failure of vision in the left eye until seven months after the onset. An extensive choroidal growth usually, though not always, has some effect upon the vision. 3. Pathological examination revealed that the epibulbar growth above the cornea—i.e., at the site at which it was first noticed—was much more massive than at any part of the choroid. 4. The gross appearance of the choroidal growth resembled a secondary or metastatic growth, in its wide and even distribution, more than a primary growth in that situation. 5. Flat sarcoma of the choroid was usually densely pigmented. This was a non-pigmented growth apart from a few streaks of pigment in the choroid, surely the normal choroid pigment. 6. Flat sarcoma was almost always relatively avascular. Throughout this growth there are many delicate capillaries. 7. Flat sarcoma often invaded the deeper layers of the sclerotic, whereas this growth had done this only to the slightest degree, and, on the other hand, had invaded to a definite extent the superficial layers of this structure in various parts.

Sir JOHN PARSONS said that epibulbar growths were very rare, and although Mr. Neame had worked out the pathology of this case with extreme care, he thought there was still a possibility that the tumour originated from a small growth inside the globe extending outwards.

Mr. MAYOU was also not quite convinced of the epibulbar origin of the growth. He thought it probable that the growth was originally a flat sarcoma; such growths often spread all round the choroid before the retina became detached and before any

deterioration of vision occurred. He suggested referring the case to a pathological committee.

Mr. TREACHER COLLINS said there was evidence that epibulbar growths did occur, such as epithelioma. In favour of the epibulbar origin of Mr. Neame's case was the distribution of the growth and its recurrence in the orbit. He had had one case of epibulbar sarcoma which was cured by radium, although only a portion of the growth was removed for diagnostic purposes.

Mr. PATON said that he had seen a case of epibulbar sarcoma in which the eye was removed. A recurrence occurred in the other eye in 1917. A portion of this growth was removed and the diagnosis confirmed by the microscope. The implantation of radium was tried in view of the fact that the patient had already lost one eye. The recurrence disappeared and the patient remained well until 1919, when a swelling occurred in the soft palate, which also disappeared under the influence of radium; this patient still survived.

Mr. NEAME said he would be glad to submit the case to a pathological committee of the Section, and the President appointed Sir William Lister, Mr. Mayou, and Mr. Treacher Collins to act on this subcommittee.

During the meeting the PRESIDENT conveyed the congratulations of the Section to Sir John Herbert Parsons on his recent honour.

LIVERPOOL MEDICAL INSTITUTION.

A MEETING of this Society was held on Jan. 5th, Dr. J. E. GEMMELL, the President, being in the chair.

Mr. EDGAR STEVENSON read a short note on extraction of cataract in the capsule, and showed lantern slides demonstrating Prof. Barraquer's "suction" operation.

Dr. NORMAN B. CAPON read a paper on

Intracranial Traumata of the New-born.

He had found intracranial hæmorrhage in 21 per cent. of infants dying shortly after birth; ruptures of the dural septa, usually of the tentorium cerebelli, were present in 25 per cent. As might be expected these figures were higher in cases of still-birth; they were 46 per cent. and 60 per cent. respectively in his own series. After reviewing the ætiology of intracranial injuries he discussed the difficulty of diagnosing the locality of the effused blood. In his own examples of infantile death following difficult labour slightly more than 50 per cent. revealed only a condition of cerebral congestion, for which early lumbar puncture was undoubtedly the appropriate treatment.

Dr. A. ROBERTSON WILSON read a paper on

The Treatment of Surgical Tuberculosis by Sun Cure at Leysin.

After a short account of the situation and climate of Leysin, and the general arrangements of the clinics, he discussed the effect of the sun on the patients under treatment, making special reference to the relationship between browning of the skin and the progress of the case, and pointing out that the greater the pigmentation the better the prospect of success. The relief of pain was also referred to. He remarked on the excellent physical conditions of the patients he had seen, and especially on the development of muscles previously atrophied, and the restoration of movement in affected joints. The treatment of Pott's disease and tuberculosis of the hip- and knee-joints as carried out by Dr. Rollier was described in detail, with the methods for reduction of the deformity and the technique of the "sun-bath," and the successes obtained were illustrated by photographs lent by Dr. Rollier. The treatment of tuberculosis in other bones and joints, of adenitis, genito-urinary tuberculosis, and tuberculous peritonitis was referred to, and the satisfactory results were mentioned. A short account was given of the treatment of convalescent cases and of the colonies of work and open-air schools established by Dr. Rollier.

PATHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

A MEETING of this Society was held in the Pathological Department of the University of Glasgow on Jan. 6th and 7th, Prof. R. MUIR, F.R.S., and Prof. J. H. TEACHER (Glasgow) presiding.

Prof. M. J. STEWART (Leeds) adversely discussed the view recently put forward that myeloid sarcoma is not neoplastic but a form of chronic traumatic hæmorrhagic osteomyelitis.—Prof. MUIR and Dr. A. LEITCH (London) brought forward two of the rare instances in which this form of growth had produced definite metastases.—Dr. G. H. WILSON (Glasgow) described several cases in which he had found curious small epidermoid cysts in relation to hernial sacs in children.—Dr. A. PINEY (Birmingham) had failed to find any lymphatics in bone-marrow, and concluded that secondary growths reach the marrow by the blood-stream.—Dr. J. A. MURRAY (London) described a long series of tar cancers in mice; the degree of histological differentiation varies a great deal in different instances, and affords no satisfactory criterion of malignancy, for which the capacity for continuous growth after autoplastic transplantation is the only sound test.—Dr. LEITCH dealt with the same subject; repeated applications of tar produce malignant tumours fairly readily in rabbits and mice, but never in rats or guinea-pigs. He also described several cases in which multiple scattered adenomata were associated with carcinoma of the rectum.—Prof. J. S. DUNN (Birmingham) had found that intracapillary glomerulitis was capable of complete repair if the process had not extended to the capsule or the neighbouring kidney substance.—Prof. TEACHER exhibited further instances of ante-mortem digestion of the lower end of the œsophagus, some of which showed attempts at healing.—Prof. H. R. DEAN (Manchester) described a fatal case of horse serum anaphylaxis in man, in which there was widespread degeneration of the liver parenchyma with infiltration with leucocytes, many of which were eosinophiles.—Prof. DUNN showed an example of carcinoma of the pancreas in which the whole of the acini were replaced by fat, leaving the islands of Langerhans apparently unaffected; there was no diabetes.—Prof. J. LORRAIN SMITH and Dr. T. RETTIE (Edinburgh) gave a further account of their inquiries into the staining of fats by hæmatoxylin after using aldehydes as a mordant. Formalin works quickly and well if free fatty acid is present, and its action is promoted by lecithin and cholesterin in the mixture. Glycerine acts because from it aldehydes are formed by oxidation. The reactions are accelerated by light if oxygen is also present.—Prof. A. E. BOYCOTT and Dr. C. PRICE JONES (London) had found that anæsthesia much retarded the restoration of the volume of the blood by the uptake of water from the tissues after hæmorrhage, and correlated their results with the influence which anæsthesia has on the shock action of histamine.—Prof. E. EMRYS-ROBERTS (Cardiff), in a discourse on heredity, advocated a complete Lamarckian system.—Dr. A. G. MCKENDRICK, Dr. W. O. KERMACK, and Dr. R. D. FINDLAY (Edinburgh) suggested that the processes of bacterial infection and physiological growth are similarly regulated.—Dr. J. CRUICKSHANK and Dr. W. E. GYE (London) had studied the consumption of glucose by normal and malignant tissues in vitro without finding any characteristic difference.—Dr. W. MACADAM and Dr. J. GORDON (Leeds) described a case of periodic vomiting in an adult seemingly due to an alkalosis and treated successfully by the administration of acid.—Dr. D. K. ADAMS and Dr. W. H. SCOTT (Glasgow) dealt with the colloidal gold reaction in cerebro-spinal fluid, remarking that they had found the test of the greatest value in the early diagnosis of nervous diseases, and exhibiting a paretic rabbit which had been inoculated from a case of disseminated sclerosis.—Dr. L. H. COULTHARD (Glasgow) had tried a large number of different preparations of the

tubercle bacillus in the complement-fixation reaction, and had found a simple saline suspension of bacilli most satisfactory. The reaction is not given by early or by advanced cases, and is of more value in prognosis than diagnosis.—Dr. A. RENSHAW and Dr. T. H. FAIRBROTHER (Manchester) presented the summary results of a large inquiry into the poisonous action of numerous aniline dyes on bacteria and protozoa, correlating the results with the chemical constitution of the substances, and finding that the toxicities for bacteria and protozoa are by no means always parallel.—Prof. C. H. BROWNING, Miss R. GULBRANSEN, and Dr. G. H. WILSON (Glasgow) described the relation of the mouse to tuberculosis. Human strains proved a little less virulent than bovine; the results of passage were inconstant, but in the end virulence generally decreased. After peritoneal inoculation the lungs are chiefly affected, even without any visible peritoneal lesion, the change being broncho-pneumonic with some caseation. Dr. Wilson had found bovine bacilli 12 times in 37 fatal tuberculous infections in early life.—Dr. J. W. MCLEOD and Dr. GORDON demonstrated the production of hydrogen peroxide by the pneumococcus and some other bacteria as a cause of growth inhibition. Organisms which develop catalase can decompose hydrogen peroxide readily, and many species which are notoriously difficult to cultivate cannot do this.—Dr. J. YOUNG (Edinburgh) described the isolation of a polymorphic coccobacillus from a number of cases of human breast cancer, and from three cases of mouse cancer. The sixth subculture on artificial media when inoculated into mice produced, in 26 of 37 animals, varying degrees of the lymphomatous leukæmia which is known to occur in these animals.—Prof. EMRYS-ROBERTS and Prof. DUNN showed a very convenient balance for weighing the smaller autopsy organs.—Demonstrations were also given by Dr. J. W. S. BLACKLOCK, Dr. J. KIRKPATRICK, Dr. D. F. CAPPELL, and Prof. MUIR.

LONDON ASSOCIATION OF MEDICAL WOMEN'S FEDERATION.

A MEETING of this Association was held on Jan. 10th at the Elizabeth Garrett Anderson Hospital. In the unavoidable absence of Dr. L. MARTINDALE, Mrs. E. E. FLEMMING took the chair.

Dr. CHARLOTTE BROWN gave a description of the

Ambulatory Treatment of Tuberculous Disease of Bones and Joints,

and showed a number of splints used by her at the High Beech Hospital, which has been established in the last two years for the treatment of cases of non-pulmonary tuberculosis by the Essex County Council. The object of her demonstration was to emphasise the many advantages of celluloid splints made on the Alton pattern for cases of bone disease where activity is arrested and where a limited amount of protected movement is beneficial. She said that celluloid splints were made from a plaster cast taken from the actual patient so that they can be most accurately fitted. They are extremely light, rigid yet elastic, very durable, and can be washed as easily as dinner plates. They are not affected by the heat of the body, and the danger of the inflammability of celluloid has been completely overcome by mixing calcium chloride with the celluloid solution. Dr. Brown described the actual making of a splint in minute detail and explained how easy this is. The length of time needed for the drying of the 30 or more layers of celluloid which have to be painted on is probably the reason why such splints are actually expensive to buy. When made at home the painting on of the celluloid actually occupies very little time. Light splints, such as she showed, could probably be used with advantage for other than tuberculous conditions. They can be used for cases of infantile paralysis with great benefit, since the correction of malposition with the allowing of a certain amount of muscular action is here very advantageous.

Reviews and Notices of Books.

CARDIOLOGY.

The Clinical Study of the Early Symptoms and Treatment of Circulatory Disease in General Practice. By R. M. WILSON, M.B., Ch.B., late Assistant to Sir James Mackenzie under Medical Research Committee; late Cardiologist, War Office Trench Fever Committee, Consulting Physician, Ministry of Pensions. With a Foreword by Sir JAMES MACKENZIE, M.D., F.R.S., F.R.C.P. Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton. 1921. Pp. 245. 15*s.*

IN this book Dr. Wilson has endeavoured to show the value of careful and exhaustive inquiry into the early symptoms which arise in circulatory disease. Exhaustion is clearly differentiated from breathlessness, and its mode of production is discussed. Breathlessness is subdivided into two main classes: (*a*) The reaction type, (*b*) the resting type, and the causation of each of these groups is indicated. Dr. Wilson shows how the lack of efficient expansion of the chest in many cases of breathlessness may increase the load on the heart, and suggests that the obvious treatment is to force the chest to expand by the application of some form of abdominal compression. In the section on pain, Dr. Wilson makes frequent reference to the views of his former teacher, Sir James Mackenzie. The viscero-sensory reflex and the viscero-motor reflex are emphasised as of great importance in the study of disease not only of the circulation but also of many of the abdominal organs. Stress is laid on the influence of the vagus and of the sympathetic nervous system upon the pulse-rate. Dr. Wilson points out that their action, though antagonistic, is closely interdependent, and illustrates this interdependence by the simile of a cheque drawn and honoured. Although it is well known that the vagus slows, and the sympathetic accelerates the heart's action, Dr. Wilson shows that in the living subject stimulation of either of these nerve systems has exactly the opposite effect to that which would have been expected, for vagal excitation reflexly calls forth sympathetic response, and causes tachycardia, and vice versa. The effects of toxins on this vago-sympathetic complex are described at some length. Dr. Wilson having had exceptional experience of trench fever is inclined to place the toxic effects of that disease in the foreground of this chapter; but he mentions that whereas the toxins of diseases such as influenza, pneumonia, rheumatic fever, trench fever, malaria, and diphtheria, all cause vagal irritation, those of the enteric group have precisely the opposite selective affinity, and excite the sympathetic system. The book is profusely illustrated; some of the tracings should have been labelled more fully.

Dr. Wilson has tackled a difficult subject, and one which has a wide bearing in medicine generally. He is to be congratulated upon the success of his labours.

The Prevention and Relief of Heart Disease. By G. ARBOUR STEPHENS, M.D., Consulting Cardiologist to King Edward VII. Welsh National Memorial Association. London: Arthur H. Stockwell. 1921. Pp. 91. 5*s.*

Dr. Stephens directs attention to the great economic importance of the prevention and relief of heart disease, quoting abundant evidence from reports of the Board of Education and other sources to show the high incidence of heart disease in this country and the disquieting mortality to which it gives rise, greater indeed than that due to tuberculosis. But whereas great efforts are being made to prevent and relieve the degree of suffering from tuberculosis, no organisation exists to prevent, combat, or mitigate the results of heart disease. He enters an earnest plea for the education of teachers and parents as the first requisite in controlling heart disease at school age, and advocates the setting up of some form of welfare

association designed to help cardiac cripples to get more suitable employment, and, when necessary, to obtain accommodation for adequate convalescence. Welfare centres coördinated under the Ministry of Health might be the means, he holds, of securing much useful work from a section of the community which is at present an appreciable drain upon the financial resources of the State.

INFLUENZA.

Studies in Influenza and its Pulmonary Complications. By D. BARTY KING, O.B.E., M.A., M.D: Edin., Physician to the London Royal Chest Hospital. London: J. and A. Churchill. 1921. Pp. 88. 7*s.* 6*d.*

THESE studies of the recent influenza pandemic are based on clinical, pathological, and radiographic observations. The first is concerned with an outbreak of influenza amongst 150 cases of malaria in the City of London (Horton) War Hospital, Epsom. The diagnosis of influenza in patients suffering from malaria is clearly difficult, and is always liable to criticism. Dr. Barty King's opinion that salicin should never be used in the treatment of influenza is of interest in view of the striking results obtained with it by certain workers; moreover, the advice that cardiac stimulants should be administered at the onset of the slightest pulmonary complications will not meet with universal acceptance. The second is devoted to the after-effects of the acute pulmonary complications. Dr. Barty King endeavours to throw some light upon the pathogenesis of pulmonary fibrosis and bronchiectasis. As a prophylactic measure he recommends the use of disinfectant inhalations early in the disease, with the view to the partial sterilisation of the respiratory passages, and also the adoption of breathing exercises soon after the temperature has fallen to normal. His explanation of the value of such exercises in cases of unresolved pneumonia due to a latent tuberculosis is not easy to understand. The third study records the epidemic as it affected the hospital female staff.

The book is a welcome addition to the study of influenza, and if it stimulates further investigation into the pathogenesis and prophylaxis of post-pneumonic fibrotic changes in the lungs it will serve a useful purpose.

DEVELOPMENTAL PATHOLOGY.

A Study in Degenerative Evolution. By EUGENE S. TALBOT, M.S., D.D.S., M.D., Professor of Stomatology, Bennett Medical College. Edinburgh: E. and S. Livingstone. 1921. Pp. 435. 25*s.*

THE author insists in this book on two things—the appreciation of the modified recapitulation of phylogeny in ontogeny, and the recognition of the effects of an "unstable nervous system," in periods of stress, on both phylogenetic and ontogenetic development. With the first of these attitudes no morphologist will disagree, but we imagine that judgment on the other will be suspended at any rate until some clear indication of the meaning of the expression "unstable nervous system" is supplied.

From passages in the first part of the book it is evident that the author is not practically acquainted with the details of embryology with which he deals, but it is equally evident that in the consideration of the face and teeth he is treating of a subject with which he is personally familiar. We would protest, however, against the apparent assumption that all lower forms are represented in some way in phylogeny. No doubt, although the present state of embryogenetic knowledge does not allow the assertion to be made definitely, the cells of the rudiments of an organ contain within themselves the phylogenetic memories, and perhaps even the latent powers, of earlier and forgotten stages; but this has reference only to a primitive past, and does not concern the equally highly specialised forms of other species of the present. Thus, to describe a case of embedded cuspid as arrest at the narwhal stage is to imply that the human species came through the narwhal, a statement no more justifiable than would be one insisting on the development of the narwhal from a human stock. The common ancestor is the missing character in this book, and, in his absence, it is a hard and thankless task to refer the vices of the individual to third cousins thrice removed.

The work is well and profusely illustrated, the photographs illustrating dental pathology being particularly good, and, even if we do not agree with the standpoint taken by the author, we can say that it is an interesting and, in many ways, a suggestive book.

MIND AND ITS DISORDERS.

Fourth edition. By W. H. B. STODDART, M.D., F.R.C.P., Lecturer in Mental Diseases to St. Thomas's Hospital. London: H. K. Lewis and Co., Ltd. 1921. Pp. 584. 22*s.* 6*d.*

THE third edition of this book announced Dr. Stoddart's conversion to psycho-analysis and presented his older and, one may still say, orthodox views together with the radically different psycho-analytical theory of mental disorders. The neurological and the psychological methods of attacking the problems of psychiatry are equally valid; each is often used exclusively. The medical psychologist, taking an expectant interest in the work of the neuro-pathologist and admitting that nerve tissue and mind are in the closest possible relation, yet finds, in certain disorders, explanations and therapeutic opportunities in terms of mind only; the neurologist has been inclined to take a less expectant attitude towards his psychological fellow-worker and finds that his conceptions as to origins can be expressed without reference to psychological processes. So different are the points of view, says Dr. Stoddart in his preface, that any attempt to describe them in the same volume is liable to present a futuristic picture.

The disadvantages of the combination of views on which we commented in reviewing the third edition have not prevented the appearance of a fourth edition of the book; and if the reader is sufficiently conversant with the two aspects of psychiatry to recognise what belongs to each aspect the author's manner of combining divergent views becomes interesting, if somewhat perplexing. On page 354, for example, we read that the purpose of the epileptic fit is of a two-fold nature—viz., to gratify sexual desire and to retreat from the world of reality; but a few pages later on we are told that one purpose of the epileptic convulsion is to eliminate toxins from the system. Setting aside the teleological presentation of the latter view, we are left in doubt whether it belongs to his discarded beliefs or whether the author is able in this case to reconcile the psychical and physical. We must remember that Dr. Stoddart, like other psycho-analysts, regards it as probable that emotional states can produce toxins, and, further, Freud ascribes the anxiety neurosis to an endotoxic factor resting upon a sexual cause. Hence the two views as to the epileptic fit are not so incompatible as they at first appear. It is less easy to find support for the advice that, from psycho-analytical considerations, pork, ham, and bacon should be restricted in the diet of epileptics.

The application of Freudian views to disorders of acknowledged organic origin will be new to many readers. The mental changes in dementia paralytica, for example, are attributed to the same psychical mechanism as that underlying other mental disorders, but the escape of complexes from repression is due to the weakening of the bond of repression by organic disease. This accords with Hughlings Jackson's conception of the escape of lower functions from control, by the destruction of the higher ones, but the author offers no suggestion as to why complexes of a particular nature should be released in this disease so that even melancholiac delusions retain an element of the typical expansiveness. Exophthalmic goitre is a psycho-neurosis, in which promising results have been obtained by analysis; alcoholism and drug habits depend upon

homosexual complexes, as does paranoia, though in the case of paranoia that knowledge has only a pathological and no therapeutic value. The author takes up an agnostic position in regard to the organic or psychogenic origin of dementia præcox.

New views on classification have led to rearrangement of chapters in this edition. Anxiety neurosis and anxiety hysteria are described in separate chapters, the former being the only condition which the author regards as a true neurosis; the frequent clinical association of the two is not mentioned. To recast the whole book might have produced a more harmonious result, but in its present form the older material still remains as a standard work on psychiatry by an asylum physician of wide experience. The doubt which remains is whether any student can safely be given a mixed bag of contradictory psychological teaching before he is in a position to estimate values; we cannot therefore recommend this book to the unqualified.

ESSAYS ON SURGICAL SUBJECTS.

By Sir BERKELEY MOYNIHAN, K.C.M.G., C.B. London and Philadelphia: W. B. Saunders Company. Pp. 253. 25*s*.

THESE essays deal with many subjects of surgical interest; all of them have been previously published. The writing is brilliant and stimulating—sometimes provocative. On nearly every page there are aphorisms which arrest the attention, and even when they do not entirely convince the intellect of the reader they compel him to think, and to ask himself why he disagrees. The task may be sometimes difficult and always useful. Occasionally the author is very dogmatic. On p. 151 we read, "If a case of gangrenous appendicitis is seen at the very earliest stage there will be universal rigidity and immobility of the abdominal wall." That statement does not hold good when the appendix is situated deep in the pelvis, and for diagnostic purposes the point is worth noting. The last essay on "The Most Gentle Profession" seems out of place in a collection of surgical essays, but no one will regret its inclusion.

DERMATOLOGY.

Skin Diseases in General Practice. Second edition. By HALDIN DAVIS, M.B., F.R.C.S., M.R.C.P. Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton. 1921. Pp. 355. 25*s*.

As is pointed out in the preface to the first edition, this book is written on the lines adopted by Sabouraud in his "Dermatologie Topographique." After preliminary chapters on pyogenic infections, eczema, and syphilis, the various diseases are arranged more or less according to their topographical distribution, so that we have a chapter on widespread eruptions, on those affecting the face, and so on; in addition, the bullous diseases and anomalies of pigmentation are considered separately. Finally there is a valuable section on modern methods of treatment, in which electrolysis, ionisation, diathermy, the X rays, radium, and carbon-dioxide snow are dealt with. There is, perhaps, something to be said in favour of this arrangement in an elementary text-book of dermatology, and the author has contrived to avoid many of the pitfalls into which one less clear-headed would inevitably have fallen; but in spite of his skill, the weak points of such a hopelessly unscientific and artificial classification are too obvious, and we feel that it detracts rather than adds to the value of the work. For example, it is a little startling to find the description of tinea versicolor in the chapter on anomalies of pigmentation, and molluscum contagiosum sandwiched between favus and circumscribed prurigo among "diseases of limited extent."

It is probable that one not well versed in dermatology would feel rather bewildered after reading the book through; he would certainly be unlikely to have any clear ideas on the ætiological classification of skin diseases. On the other hand, although suffering from its unnatural arrangement, the subject-matter is admirably presented and is written in a clear and original style. Histological details are wisely omitted, and the directions for treatment are singularly good, for they are given fully and logically and the reader is not confused by being asked to take his choice of a number of alternative methods. The author has, indeed, succeeded in his desire to make his book "a thoroughly practical work." It is surprising to read that the treatment of acne varioliformis is not difficult, and that scabies is always present upon the hands. It is hardly true to say that the cause of molluscum contagiosum is unknown, since Wile and Kingery have conclusively shown that it is due to a filtrable virus, and that the tumours can be reproduced by the intracutaneous injection of filtrate. As in most other text-books of dermatology, the simplest and most efficient treatment of oriental sore—namely, the local application of an ointment containing tartar emetic—is omitted, although the administration of this drug by intravenous injection is recommended. The section on eczema is hardly full enough, and might well have been brought more up to date; it will doubtless be revised in the next edition.

The illustrations are clear and well chosen, and the book, as a whole, admirably serves the purpose for which it is intended.

GYNÆCOLOGY AND OBSTETRICS.

A Text-Book of Gynæcology. By JAMES YOUNG, D.S.O., M.D., F.R.C.S. Edin., Assistant Physician, Royal Maternity Hospital; Lecturer in Clinical Gynæcology and Clinical Obstetrics, Edinburgh University. London: A. and C. Black. 1921. With 168 illustrations. Pp. 334. 20*s*.

IN this book Dr. Young gives the essential facts of gynæcology in a concise form. The various sections deal with Anatomy and Physiology, Examination of the Patient, Symptoms, Displacements of the Uterus, Infections, Extra-Uterine Gestation, New Growths, and Errors of Development. The last section deals with Operative Gynæcology.

The work contains all that is needful for the student, and the author has been careful not to include any unnecessary matter. It is essentially a book for one commencing the study of the subject rather than for one more advanced. As might be expected, in view of the valuable research carried out by Dr. Young on these subjects, the sections dealing with the physiology and functions of the ovaries and menstruation are particularly good, while the volume as a whole will form a safe guide to the reader, for the teaching is based on sound principles. The illustrations are rather unequal, for while the plates, mainly showing microscopic conditions, are very good, the wood-cuts in the text are poor. There is a fair index.

Text-Book for Midwives. Third edition. By JOHN S. FAIRBAIRN, M.A., F.R.C.P., Obstetric Physician, St. Thomas's Hospital; Lecturer on Midwifery, St. Thomas's Hospital Medical School, &c. Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton. 1921. Pp. 365. 25*s*.

THE fact that this work is now in its third edition shows that it has been appreciated by the class for whom it has been written. In this edition the chief changes are to be found in the section dealing with the infant, a large part of which has been rewritten, and, in accordance with the plan of the rest of the book, emphasis has been laid on the physiological and hygienic aspect of the subject. The chapters dealing with the management and the feeding of the infant are particularly good. A midwife who reads this book would have no excuse for not persisting in her efforts to secure breast-feeding of any babies under her charge, and if this proved impossible, the directions given for artificial feeding are so full and emphatic that she could hardly fail to succeed in carrying out this part of her duties. We repeat the recommendation of this work which we gave on its first appearance.

GOUT, RHEUMATISM, AND ARTHRITIS.

The Physiology of Gout, Rheumatism, and Arthritis as a Guide to Accurate Diagnosis and Efficient Treatment. By PERCY WILDE, M.D., Physician to the Lansdown Hospital, Bath. Bristol: John Wright and Sons, Ltd.; London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd. 1921. Pp. 229. 12*s.* 6*d.*

IN the preface the author expresses a hope, with which all will sympathise, that the book will enable the practitioner to give the "arthritic" patient a more hopeful outlook. The full account of treatment which forms the latter part of the work, and which is based on the author's extensive experience in a province in which his opinions may be expected to carry weight, may indeed prove of value. But we must disagree uncompromisingly with his statement that he has no theories. So many, such confused and such ill-founded theories has he that the reader may abandon all hope of unravelling his meaning. "If I were a chemist," he says on p. 68, "I might express myself better...." We hope and believe he would, for, as they stand, his chemical views would have caused even to Roger Bacon a profound shock. Dr. Wilde has apparently convinced himself that uric acid does not exist in the body nor even normally in the urine. "The true position is this: uric acid begins its existence in the kidney, and then only under uncommon conditions" (p. 75). The true urates, he tells us (p. 28), are "combinations made by urea with chloride of sodium," whereas "the crystals described as urate of soda by the earlier writers" (including Garrod) "contained neither uric acid nor soda"; these are in reality "lactophosphate of lime" (p. 48). Apparently, lactate of ammonium and lactophosphate of lime explain such various symptoms as grey hair (p. 137) and gonorrhœal joints (p. 183). On p. 69 the author feels "justified in saying that uric acid contains no urea" although it "contains lactic acid." How all this brings hope to the arthritic we cannot imagine. Typical of Dr. Wilde's physiological outlook is the following (p. 86): "We must not regard the skin as a simple regulator of heat, but as a source of heat." He seems to imagine that much of the body heat is in fact generated there. If the application of physiology to medicine were to bring our theories to such a pass as this the bewildered practitioner would rightly have none of it.

WHOOPING-COUGH.

Über Klinik und Epidemiologie der Pertussis. Von Dr. D. POSPISCHILL, Primararzt am Kaiser Franz Joseph Regierungs-Jubiläums-Kinderspitale der Gemeinde Wien. Berlin: S. Karger. 1921. Mit 3 Kurven und 2 Tafeln. M.33.

THIS work, which is based on a study of about 25,000 cases of whooping-cough observed in the course of 19 years at a large hospital for contagious diseases at Vienna, is divided into seven parts, in which the writer, who is senior physician to the hospital, discusses the pulmonary, cerebral, and vascular symptoms, pertussis pyæmia, and other accidental infections, and the treatment of whooping-cough. No account is given of the historical aspects, bacteriology, hæmatology, X ray findings, vaccine prophylaxis, and vaccine treatment of the disease, nor are recent therapeutical methods, such as benzyl benzoate or intramuscular injections of ether, or any reference to the literature included in a work which, it is true, does not claim to be a complete monograph on whooping-cough, but only an account of the writer's own observations.

Throughout the book Dr. Pospischill lays emphasis on two points, the first being the extraordinarily long duration of the disease, and the second the important influence of pertussis on the health of the child. He declares that whooping-cough is a chronic disease which often remains in a latent condition throughout childhood, and that symptoms may even reappear in adolescence on the occasion of an attack of measles. He considers that a very large proportion of all diseases in children, in Vienna at least, is due to pertussis. In confirmation of this surprising statement he alleges that there are only a few cases of bronchitis and pneumonia among the children of Vienna, apart from lobar pneumonia, which are not associated with whooping-cough. Dr. Pospischill does not accept the old doctrine that the absence of signs in the lungs in contrast with the violence and obstinacy of the cough is characteristic of pertussis, but maintains that an almost invariable feature of the disease is the presence of consonating râles usually confined to a small area at the base of the right lung anteriorly. The cerebral manifestations are classified in three groups according as they are caused by direct specific injury to the brain, specific damage to the cerebral vessels, or pyæmic processes due to secondary infection.

The most interesting parts of the book deal with the relation of whooping-cough to tuberculosis, the influence of whooping-cough on measles, the pyæmic manifestations and the other accidental infections. Dr. Pospischill maintains that among the many thousands of autopsies performed by him he has found nothing to indicate that tuberculosis was aggravated by pertussis; and, moreover, has been struck by the rarity of tuberculosis generally, and especially by the extremely small number of examples of active disease. Cases in which tuberculosis was shown by the autopsy to be responsible for death were very exceptional, especially after exclusion of cases associated with measles, and it is only within the last two years, as the result of the war, that there has been an increase of tuberculosis. Discussing the relations of measles and whooping-cough, Dr. Pospischill states that in children who have been infected with pertussis measles may give rise to a relapse of the disease. He even declares that when the temperature does not fall, or rises again after disappearance of the eruption, the condition is due to a relapse of pertussis, provided a middle-ear complication can be excluded. Fatal cases of measles, in his opinion, are almost always due to pertussis.

The work is marred by an extremely verbose and florid style, which accounts for its length in spite of its incompleteness, needless repetitions, and unwarrantable assumptions, of which we have given some examples. The absence of an index still further detracts from its usefulness.

A PRIMER FOR DIABETIC PATIENTS.

First edition. By RUSSELL M. WILDER, Ph.D., M.D., MARY A. FOLEY, and DAISY ELLITHORPE. London and Philadelphia: W. B. Saunders Company. 1921. Pp. 76. 7*s.* 6*d.*

THIS small book has been issued from the Mayo Clinic in order that diabetic patients may understand the principles underlying the dietary treatment of their disease. The section which deals with this point is very short but is admirably adapted for its purpose. The instructions about the necessity of weighing the foods carefully are good, and the patient is advised to learn to think in grammes and cubic centimetres, which are, indeed, much simpler even for the uneducated to understand if the appropriate scales and measures are available. He is also recommended to keep a careful diary while he is being taught about his treatment so that he may have a permanent record both of his questions and of the physician's answers. It is indeed difficult for the patient to remember all that he is told; surprising mistakes happen in practice and such a diary may well be of the utmost assistance to the patient. Quite half the book is devoted to a description of meals suitable for four different grades of patients. These seem to be well thought out and show the variety which a patient may have, if sufficient time, forethought, and money can be given to the matter. For English patients the recipes are not so useful, as they frequently include American preparations not easily obtainable here. The tables of food values will be useful both to the patient and also to the medical practitioner.

MY BALKAN LOG.

By J. JOHNSTON ABRAHAM. London: Chapman and Hall. 1921. Pp. 311. 15s.

Mr. Johnston Abraham is well known to many readers by reason of "A Surgeon's Log"—a book of travel worthy to rank with "Eothen" and "The Monasteries of the Levant." His present work shows the same keenness in observation, restrained artistry in the telling, and that most precious asset for a traveller, a sense of humour, without which last he could hardly have survived the appalling experiences which he underwent.

Mr. Johnston Abraham and his companions made up a small party of six medical men, each with two orderlies, who went out as a Red Cross unit in October, 1914, for service with the Serbian Army. They started work in Uskub in a disused tobacco factory, destitute of any conveniences for a hospital except space. As a matter of fact, the unit did not act as a hospital but as a clearing station. When they arrived it was being run entirely by a young Russian medical woman with the assistance of a few voluntary workers, only two of whom had any medical training whatever, and these were first-year students. So it may be imagined with what relief she welcomed the advent of the Red Cross unit, once she had got over her fear that she would be shelved. How they all worked together, struggling against almost overwhelming odds, must be read in Mr. Abraham's pages; but the difficulties of running a hospital with practically no provision for lighting, heating, or sanitary arrangements, though almost insuperable, were overcome. The whole account is a grim record of the horrors of war; the wounded came down from the front after long days in the train or in wagons, with wounds untended, "compound fractured thighs, . . . usually in short lateral splints, always septic and mostly with three to five inches of shortening." Secondary hæmorrhage was very common, and Mr. Abraham says, "I think we must have tied practically every main artery in the body, except the aorta, innominates, and common iliacs, many times over." And then to crown all typhus fever broke out; some of the unit contracted this disease, some of them diphtheria, but they struggled on. In the first three months of 1915 there were half a million cases of typhus in the country with over 120,000 deaths. Early in March came Colonel William Hunter's Sanitary Mission of 25 officers, and the war against lice initiated by this mission led to the following wonderful change: "At the beginning of March there were 1500 fresh admissions to hospital daily: in less than three weeks they were down to 500, and in a month to 100." The unit, or what was left of it, was disbanded.

Of the many books which we have read dealing with medical service at the war, this one, which reads like Defoe's "Journal of the Plague Year," is the most simple and vivid.

JOURNALS.

JOURNAL OF LARYNGOLOGY AND OTOLOGY. November and December, 1921.—The November issue contains an article by Mr. F. J. Cleminson on nasal sinusitis in children; this is a subject which has recently attracted increasing attention, although, probably, anything more than a transient mucopurulent catarrh of the antrum is extremely rare in children below the age of 10 years. Mr. Cleminson here deals only with the antra, the cavities most liable to become infected. The symptoms are similar to those produced by nasal catarrh and adenoids, but persistent frontal headache, especially if unilateral, should direct attention to the nose rather than to the nasopharynx.—Mr. J. K. Milne Dickie contributes a résumé of his experiences as an otologist to the army in France during the war, on which we have already commented.[1]—Dr. Gavin Young gives the results of some investigations on the vestibular reactions in deaf-mutes. All the cases of hereditary deaf-mutism gave approximately normal vestibular reactions, and all those rendered deaf-mute by cerebro-spinal meningitis showed destruction of the vestibular apparatus by giving no response to caloric or rotation tests: on the other hand, in syphilitic deaf-mutes, the reaction was normal in some and completely absent in others.—Mr. W. F. Wilson relates a fatal case of a pin in the œsophagus in which, before admission, a coin-catcher had been used, had failed to remove the pin and had itself become impacted.—Prof. Chevalier Jackson contributes a review of peroral endoscopy; he makes the point that a tube small enough to enter the main bronchi will readily pass through the larynx, and that, from this point of view, tracheotomy and "lower bronchoscopy" offer no advantage.

To the December number Mr. G. Wilkinson contributes some considerations on the mechanism of the cochlea; accepting the sympathetic resonance theory of audition, he makes an attempt to estimate the load on the segments of the vibrating basilar membrane.—There is an abstract of a notable article by Dr. Max Halle describing his operation for the treatment of ozæna. A vertical incision is made through the mucosa of the lateral nasal wall in front of the turbinals, and carried across the floor of the nose; the muco-periosteum is elevated from the floor, and, following the line of incision, the outer wall is chiselled through and forcibly pushed over towards the middle line. The corresponding surfaces of septum and inferior turbinal are previously refreshed and become fixed together by adhesions, the breach into the antrum being packed with gauze to keep the displaced wall in its new position. The author claims brilliant results from this operation.—Mr. M. Vlasto has tried, in the post-mortem room, whether in man the ventricle of the larynx can be so stripped as to produce a raw surface, the healing of which would draw aside the vocal cord on the lines of Hobday's operation for roaring in horses; he finds that this cannot be done in the human larynx, the anatomy of which is very different from that of the larynx of the horse.—Captain E. D. Dalziel Dickson describes a case of revolver bullet successfully removed from the sigmoid sinus, where it was found lying in aseptic clot.

IN the MILITARY SURGEON for December, 1921, Lieut.-Colonel Fielding H. Garrison is tracing the development of military medicine from its origins in Mesopotamia, whose fruitful wheat-fields enabled its inhabitants to attain to culture sooner than any other people in the world.—Dr. Haven Emmerson discusses the sanitary reports of medical officers in charge of units or aggregations, by which the chief surgeon learned the condition of troops he had no chance to visit. Some officers let no difficulty deprive their men of a high standard of living, others excused any discomfort on the ground of war emergency; but the easily-satisfied medical officer was apt to have in his unit many cases of communicable and infectious disease, and so was given away. He finds that 20 square feet per man in billets was too little. 60 square feet are required in U.S.A., but in France billets giving 40 square feet per man showed low disease prevalence and sufficient comfort. Ventilation cannot make up for overcrowding on the floor. The American Expeditionary Force was pleased with the Horsfall destructor for the incineration of fæces, and with the Canadian dry-air delousers.—Mary Augusta Clark, "Statistician of the American Social Hygiene Association," discusses the Venereal Disease Statistics of the U.S. Navy and Army for 1919.—Major A. T. Cooper describes how an intelligence test, proposed by the Medical Department, and practised on a newly-raised body of 157 men, all strange, enabled him to choose his N.C.O.'s quickly and, substantially, he thinks after nine months' work with them, correctly. The nature of the test is not detailed.

[1] THE LANCET, 1921, ii., 1069.

THE LANCET.

LONDON: SATURDAY, JANUARY 21, 1922.

Vital Statistics in 1922.

WITH the New Year the Registrar-General is issuing in revised form the customary weekly return of births and deaths, which is now to include the hitherto unpublished weekly notifications of infectious disease. The complete title of the first issue for 1922, which can be obtained through any bookseller or directly from H.M. Stationery Office at the price of one shilling, is: "Weekly Return of Births and Deaths registered in County Boroughs and other Great Towns and of all Cases of certain specified Infectious Diseases notified in Boroughs, Urban and Rural Districts and Port Sanitary Districts in England and Wales during the week ended Saturday, 7th January, 1922." Thus the new weekly return will now include statistics which previously were compiled in and issued from two Government Departments, if it be permissible to write of the General Register Office as a separate department from the Ministry of Health. The Ministry of Health, and its predecessor the Local Government Board, for many years have collated weekly returns of notified infectious diseases from every sanitary district in England and Wales, and have circulated the document summarising these returns to every medical officer of health in the country. The document was marked "Confidential: not for publication," largely to meet the views of health resorts, whose local authorities disliked the awkward publicity attaching to the early publication of the fact that a case, say, of small-pox had occurred in their midst. This timidity has gradually decreased in the light of experience, and it has now become practicable to issue these returns without restriction. The document as it now appears must give pleasure to Dr. JOHN TATHAM, former superintendent of statistics of the General Register Office, who was a pioneer in the work now brought to completion. For some years prior to the date at which the work was undertaken by the Local Government Board he compiled and distributed from the Public Health Office of Manchester a list of weekly notifications in the towns whose officers were willing to contribute. Every medical officer of health, furthermore, will rejoice that he will now possess in one cover the official returns of sickness and mortality, and will no longer need to refer, week by week, to two bulletins.

The change is no merely formal one, for the general public has begun to take a very keen interest, as reflected in the columns of the daily press, in the locations of infectious disease throughout the country. The new bulletin will at once give the information that during the first week of January 13 cases of small-pox were notified in boroughs or districts outside London, and by letting the eye run down the column the reader can easily pick up the additional facts that 1 of these cases occurred in Chester, 4 in Manchester, and 8 in the West Riding of Yorkshire, of which 7 were in Saddleworth and 1 in Slaithwaite urban districts. Another glance shows that of the 1547 cases of pneumonia notified from England and Wales, 535 were in the County of London, which recorded in the same week 354 deaths from influenza. It would similarly be possible to follow in any desired area or district the notifications of pneumonia and the deaths from influenza between which no doubt at present a close relation exists. The change in the return has involved the omission of three useful paragraphs summarising the numbers and causes of death in the 96 great towns and the administrative County of London respectively. Probably the Registrar-General is right in leaving those who refer to the return to draw their own conclusions and make their own comparisons. He is rather in the position of the writer of an article who prefers not to provide a summary of it, in order that his readers may scan every word he has to say.

The remaining tables of the old form of weekly return are substantially retained with some rearrangement and economy of space. We note with approval that Table 5, recording comparative vital statistics for the British Empire and certain foreign countries, now becomes Table 2 and occupies a very prominent place. In this table are given the births, deaths, annual death-rate, and actual number of deaths from enteric fever, small-pox, measles, scarlet fever, whooping-cough, diphtheria, diarrhœal disease (under 2 years), and influenza, as well as the estimated population for the latest accessible week, in London, Calcutta, Paris, Berlin, Vienna, New York, Montevideo, and other important places. Cities in the British Empire other than India will be included when the figures become available. A comparison of births and deaths in these centres alone would give food for thought on large questions of social hygiene and international relations, while the influenza and small-pox columns enable the most casual reader to observe the propagation of two plagues of mankind throughout the world. The Registrar allows himself one single small editorial note, and that is naturally in regard to influenza. The increased mortality of the first week of the year was, he says, due largely to the increased prevalence of influenza, the deaths from this cause in the aggregate of the great towns being nearly twice as many as in the previous week, while in London the number of deaths from this cause rose in the same period from 151 to 354. Now that the weekly return is no longer issued gratis but has to be paid for by every user, we predict for it a more extended use and a wider field of application. Apart from medical men, members of health committees and others interested in public welfare can hardly afford to omit a study of the figures from week to week.

Cæsarean Section and its Limitations.

THE autumn and winter numbers of the *Journal of Obstetrics and Gynæcology of the British Empire* have been published together as one number entirely devoted to the subject of Cæsarean section. The editor, Mr. COMYNS BERKELEY, is to be congratulated on producing an excellent symposium. Over 100 pages are occupied by the results of a collective investigation undertaken by Prof. MUNRO KERR and Mr. EARDLEY HOLLAND for the annual meeting of the British Medical Association in 1921. The value of such a collective investigation is shown particularly in the mortality tables. Every obstetrician knew that Cæsarean section entailed much more risk to the mother when it was performed after unsuccessful attempts at delivery with the forceps, but it must have been a surprise to some to learn that the mortality in such cases was no less than 26 per cent., whereas the mortality was only 1·6 to 1·8 per cent. when the operation was performed before the onset of labour or early in labour. Again, Cæsarean section in cases of eclampsia has been so highly spoken of by

some of the younger obstetricians that it is rather a shock to learn that the maternal mortality in such cases was 32 per cent., even when it is realised that in some of the cases Cæsarean section was performed because of the severity of the symptoms. A most painstaking and elaborate analysis and tabulation of 4197 cases of Cæsarean section, performed in public hospitals in the years 1911 to 1920 inclusive, has been made by Mr. EARDLEY HOLLAND. Separate papers deal with Indications for Cæsarean Section; Methods of Performing Cæsarean Section; Cæsarean Section in the Treatment of Placenta Prævia; the Lower Uterine Segment Incision in Conservative Cæsarean Section; Rupture of the Cæsarean Section Scar in Subsequent Pregnancy or Labour; Cæsarean Section in Infected Cases of Obstructed Labour—with details of technique. The whole subject is, it will be seen, dealt with under every heading.

Dr. G. BLACKER contributes a paper on the Limitations of Cæsarean Section, which should be read as a timely and needed warning against an indiscriminate performance of Cæsarean section. The last paragraph of this paper may be quoted in full: "It is obvious from a study of this series of cases [which includes impacted shoulder presentations, hydramnios, hydrocephalus, and varicose veins] that there is some ground for the belief that Cæsarean section is being resorted to needlessly, and in a large number of cases in which it is not really necessary, and the time has come for a protest to be made on behalf of those teachers who still believe that many of these cases can be safely and properly treated by a skilled obstetrician, without resort to abdominal section, and that an operation should not be resorted to, as an easy way out of a difficulty, without due regard to the risk inseparable therefrom to the life of the mother, and in the, as they believe, mistaken belief that the life of the child should be considered as of equal value to that of the mother. The best accoucheur will be he who endeavours so far as lies in his power neither to sacrifice the life of the child to that of the mother, nor the life of the mother to that of the child." There is no doubt that Cæsarean section offers to the obstetrician the simplest and easiest way out of a difficulty, and there is a distinct danger of his being led to take the line of least resistance even though it causes an unjustifiable risk to the mother. Much has been written and said during recent years on the importance of treating labour as surgically as possible, and all will agree with this; but a narrow view leads some to consider that it is "unsurgical" to treat a case of difficult labour in any other way than by performing a major operation, "surgical treatment" and "operative treatment" being, in their minds, synonymous terms. It has been noticed during the last few years by examiners in midwifery that candidates from all parts of the country suggest Cæsarean section as the first treatment to be thought of in cases of eclampsia, placenta prævia, accidental hæmorrhage, and other conditions. The most striking and dramatic method of treatment is the one which will remain in a student's memory to the exclusion of others, but the student's ideas must reflect to a certain extent the teaching which he has been given. The late Dr. HERMAN once wrote, in a review of a book on midwifery, that in the past the qualifications necessary for an obstetrician were a thorough experience in midwifery and a familiarity with the writings of the men who had gone before, but that there was now a danger of substituting for these qualifications a facility in performing major operations and a knowledge of bacteriology. The science and art of midwifery will not advance but will deteriorate if Cæsarean section is made the panacea for all cases of difficulty. We have already quoted the maternal mortality in cases in which Cæsarean section was performed for eclampsia—viz., 32 per cent. Dr. BLACKER quotes the mortality in eclampsia treated by methods other than Cæsarean section in the Rotunda Hospital as 7·3 per cent., in Stroganoff's cases as 8·9 per cent., and in Lichtenstein's cases as 5·3 per cent.

In dealing with cases of obstructed labour it is necessary sometimes to take long views. It is easy to exaggerate the importance of delivering a living child at some extra risk to the mother. Take the case of a young woman in her first labour, not seen until labour is in progress. It is better in some circumstances to sacrifice the child not only for the sake of the mother, but also for the sake of subsequent children. If Cæsarean section is performed, at a risk which may be small in itself though greater than that of extraction after craniotomy, the mother is left with a scar in her uterus and with an undilated pelvic floor. In subsequent pregnancies there is a small but definite risk of rupture of the scar even if labour is induced prematurely. The adoption of Cæsarean section as the routine practice in the treatment of severe cases of eclampsia is to be deprecated, on the same grounds if on no others, for most cases of eclampsia occur in primigravidæ. The comparatively high degree of sterility after Cæsarean section must also be remembered. When an obstetrician is called to the hospital in the small hours to a patient with obstructed labour due to contraction of the pelvis of moderate degree, and finds that the child is alive, that the patient is very anxious to have a living child, and that everything has been prepared for Cæsarean section, it is difficult for him to refuse to perform the operation and to decide to perforate the head of the child, but is not the latter the wiser choice? If attempts at delivery with forceps have been made outside, there can be no doubt of the wisdom of sacrificing the child rather than operating at grave risk to the mother. Let us remember the aphorism that "the mother may get another child, but the child cannot get another mother." Even if there is not much likelihood of infection, craniotomy, followed by induction of premature labour in subsequent pregnancies may be the best treatment and result in the birth of several children with no more risk to the mother than in normal labour. Twenty years ago in some of the clinics in Berlin it was the rule to allow every patient to try to deliver herself in her first labour, even if it was almost certain that the child could not be born alive and must be eventually extracted after perforation of its head. Sometimes a living child was born naturally, although this had seemed to be hardly possible. If, on the other hand, the child lost its life that life was not lost in vain, for the birth of subsequent children, after induction of premature labour, was rendered easier and safer. Induction of premature labour is too valuable a method of dealing with moderate degrees of contraction of the pelvis to be discarded as being old-fashioned. Dr. BLACKER quotes figures from University College Hospital and Queen Charlotte's Hospital—no maternal mortality in 307 cases, with birth of 265 living children. If the limitations of Cæsarean section are borne in mind and efforts are made to acquire skill in other methods of delivery the value of Cæsarean section in saving maternal and fœtal lives will be enhanced. The study of this valuable number of the *Journal* impresses on the reader the importance of the views held by many obstetricians—viz., that all primigravidæ and all multiparæ in whose labours there is

likely to be difficulty should be confined in a hospital or nursing home, unless the conditions in their own homes can be made to conform to those in a hospital.

The Influenza Wave.

THE number of fatal cases of influenza occurring in London has increased during the past week, and the disease has not the serious proportions or characteristics of the 1918–19 pandemic. A recrudescence was expected in February of this year in accordance with the periodicity curve worked out by Dr. J. BROWNLEE, and published in our pages[1] in November, 1919. BROWNLEE showed that influenza is practically non-existent in the summer and autumn, the maximum of nearly all epidemics falling between January and May. The great outbreak in October during the recent pandemic was presumably the exception which proved this rule. The interval between the minor recrudescences is approximately 33 weeks, but if an epidemic falls due in the autumn it usually fails to materialise. The incidence of influenza, bronchitis, and pneumonia is also to a certain degree interdependent. BROWNLEE's periodicity curves have not passed unchallenged, and Mr. B. E. SPEAR contended[2] that the 33-weekly periods of incidence had no existence in fact, the outbreaks following rather a seasonal curve, with a maximum in February or March. Dr. C. O. STALLYBRASS, however, supported BROWNLEE as a result of his investigations of the disease as it affected Liverpool, finding evidence of minor cycles of 33 weeks, and major ones at approximately 10-yearly intervals. The study of periodicity in disease has its fascination, but it is of necessity more involved when the nature of the virus is not definitely established. There are many who still hold that the major and minor varieties of influenza are caused by different organisms, whereas in other diseases of doubtful ætiology, such as scarlet fever, minor seasonal cycles and major epidemics occur without leading to any assumption of a difference in infecting organisms.

Whatever the actual nature of the infection in the severer form of influenza, the brunt of it is borne by the lungs. Dr. D. BARTY KING, whose book we review in another column, had the opportunity of making a study of the pulmonary sequelæ in an outbreak occurring at a malaria hospital, and he makes some useful suggestions regarding prophylaxis, immediate and remote. In regard to the latter, fibrosis of the lungs is not in practice very frequently seen after influenza, but its incidence deserves further investigation, and any measures that can prevent its occurrence or that of its more dread results, bronchiectasis and abscess of the lung, are worthy of the fullest consideration. The relation of the clinically severe to the clinically mild form of influenza being still undetermined, any practicable attempt to hinder in individual cases the passage from one into the other should be made. In an article, also in our present issue, Dr. GRAHAM WILLMORE and Dr. F. M. GARDNER-MEDWIN call attention to the paralysis of the leucopoietic mechanism as a factor in lowering resistance and opening the way to bacterial invasion. Deficiency of white blood cells in the peripheral circulation has, of course, long been noted as one accompaniment of severe influenzal infection. Dr. WILLMORE sets forth in a table the leucocyte count of eight recent cases of chance influenzal infection observed in a chronic dysentery ward—all mild, with the exception of a case in which the count was 5000, of which only 29 per cent. were polymorphonuclear cells. In a series of cases treated in Egypt during the epidemic of 1918–19 he and his colleagues proceeded to the logical step of producing an artificial leucocytosis by means of nuclein injections. In 12 cases with pulmonary complications, all so seriously ill that a fatal issue was reasonably anticipated, a nuclein injection produced a considerable rise in the leucocyte count, followed within 48 hours by a true critical fall of temperature. As in the familiar pneumonic crisis, the euphoria did not correspond with the devolution of physical signs, for some of the influenzal patients continued to spit blood for some time after their temperature became normal and their toxic symptoms were relieved. Cyanosis even persisted for a day or two after the clinical crisis. The injections gave rise to some local inconvenience, but patients nevertheless solicited a second dose in view of the feeling of well-being which the first had given them. The number of cases was small, and Dr. WILLMORE himself regretted the circumstances under which it was impossible to institute a rigid system of controls, but his success has been sufficient to make the method worthy of attention by others.

[1] THE LANCET, 1919, ii., 856.
[2] Ibid., 1920, i., 589.

THE APPOINTMENT OF M.O.H. FOR MANCHESTER.

AN advertisement has appeared announcing the impending vacancy of the post of medical officer of health for Manchester, and offering, as the salary of his successor, £1500 per annum without bonus. We have no hesitation in saying that the offer should not, and probably will not, attract applicants of the status and equipment that a city like Manchester ought to expect.

There are different ways of estimating what the salary of a medical officer of health of a great city should be, and there is none that can escape criticism, though the conclusion in each case may be that the salary advertised by the city of Manchester is far too small, having regard to the position which the medical officer of such a city must fill, and to the responsibilities which he will have to shoulder. A sliding scale of so many pounds for so many persons has been suggested as giving the correct figure; the method has the merit of simplicity, but the results would be abnormal in numerous instances. Incomes made in practice are not to be used safely as an index to the remuneration of whole-time officials, the measures of risk being so totally different. Comparison of the salaries of medical officers with the salaries of other officers of big corporations is often employed to arrive at the just income of the medical officer, but this method is open to the reflection that the duties are often not comparable. Nor can we shut our eyes to the fact that members of other professions, not so highly standardised or so publicly useful as our own, are in the bulk more highly paid than doctors. This is wrong; it ought to be changed, and it is legitimate to work towards the change. But in concrete cases, and in the business world, we have to deal with what is, and not with what ought to be. Engineers of high standing are paid at the moment more highly than doctors of high standing, and this is the awkward truth that faces all of us when we draw inferences as to the right pay of the one from the facts known about the pay of the other profession. But while we must allow for the force of the fact, we do right to point out that it is ridiculous to give the engineer double the pay of the doctor. Each of the arguments we have quoted has its weight in the scale against the offer from Manchester, and the sum of the arguments is that £1500 is not the salary which the city of Manchester should offer to its medical officer of health.

Annotations.

"Ne quid nimis."

THE IMPERIAL CAMPAIGN AGAINST VENEREAL DISEASES.

THE sixth annual report of the National Council for Combating Venereal Diseases shows that an immense amount of valuable work was accomplished during the year ending June, 1921. The section of the report which deals with the extension of the campaign throughout the Empire is of special interest. It is probably within the knowledge of most of our readers that with the sanction and assistance of the Colonial Office, the Foreign Office, and the Treasury, the Council sent out educational commissions in the autumn of 1920 to certain of the Crown Colonies and Protectorates. One commission went to the West Indies, another to the Far East, and the third visited Gibraltar and Malta. The terms of reference given to each commission were, in brief:—

1. To confer with the Colonial Government authorities as to the steps—both preventive and curative—that can be taken locally to reduce the incidence of venereal diseases.

2. To discuss with the local authorities the preparation of constructive proposals with reference to the possibilities of developing a complete scheme for prevention and treatment in each colony.

3. To report to the National Council the local conditions as to venereal diseases at present existing in each colony.

The work of the commissions was completed in the following June, and a consideration of their reports indicates that the Empire is beginning to realise the need of tackling with vigour the whole question of the venereal diseases. In almost every centre visited, from Jamaica to Shanghai, organisations were already at work, or have been begun through the stimulus given by the visit of the commissioners. Everywhere the commissions would seem to have been well received. In Hong Kong the Governor invited them to prepare a report and recommendations, which are now under consideration by the Legislative Council. In Ceylon a branch of the National Council was established under the presidency of the Governor, and the Chamber of Commerce undertook to look into and, where necessary, improve the social conditions for the men of the mercantile marine and the junior employees of firms. In this excellent work the Colombo Ladies' League is coöperating. In Trinidad the Government has accepted the principles of the National Council, and a far-reaching scheme for clinics and treatment has been initiated. In Barbados, where the facilities for treatment are apparently quite inadequate, a Women's Society has been formed to work on the lines of the National Council. In Bermuda, where treatment also would seem to be inadequate, the Attorney-General has drafted a Bill in the same terms as the English Venereal Diseases Act.

All over, the visits of the commissions would seem to have had an excellent effect, and a fresh stimulus was given to educational propaganda, and to the initiation, wherever possible, of more thorough treatment. From their study of the conditions in the centres visited the commissions have been able to prepare comprehensive reports dealing with each locality. These are now in the hands of the Secretary for the Colonies, and with their reports the commissions have submitted many valuable recommendations. In the first place they recommend that some form of medical direction be undertaken from the Colonial Office. This will serve to coördinate and guide the colonial medical service. They further recommend that facilities for free diagnosis and treatment of venereal diseases be provided by the Colonial Governments for the whole population of each colony; and they add a recommendation, which seems to us to be of paramount importance—viz., that the requirements of the mercantile marine be provided for. If this last excellent suggestion is put into practice, sailors who all too often, through the exigencies of their calling, are compelled to abandon treatment at home centres before they are quite cured, will be able to procure continuation treatment at colonial ports of call. If the commissions succeed in doing no more than effecting this, they will not have worked in vain; and we would suggest that the National Council or the Ministry of Health placard every waiting-room, attached to V.D. clinics in home ports, with a list of treatment centres in the colonies. Sea-going patients may be trusted to make a note of them. As was to be expected the commissions recommend the suppression, as far as possible, of prostitution. This is an ideal tremendously difficult to carry into effect, but much may be done to stamp brothels out in the immediate neighbourhood of sailors' homes and lodging-houses, and the admission of known prostitutes to ships in harbour should be put down with an iron hand. There is little doubt that many of our young sailors contract venereal diseases while in foreign or colonial ports and, arriving home uncured, become potential sources of infection.

We cannot hope to stamp out venereal diseases in this country if there is not a concerted and world-wide alliance of effort against them. The possibility of such an alliance may seem Utopian, but it will be a long step in the right direction if the colonial centres visited by the commissions will whole-heartedly put their recommendations into effect.

EMPIRICISM IN INFANT FEEDING.

INSPECTION of a number of the infant welfare centres which have been established in this and neighbouring countries during recent years cannot fail to impress the investigator with the high degree of adaptability of the human alimentary canal, even at the most tender age. Large numbers of young children will be found flourishing on a series of diets of the greatest diversity, and a doubt must often be left in the mind of unprejudiced observers as to whether these good results are as wholly due to the formula of each particular diet as the originator of the diet would have us believe. One of the more recent of such diets, and by no means the least complicated, is the "butter-flour" mixture of Czerny and Kleinschmidt. By simmering 20 g. of butter over the fire, some of the volatile fatty acids are driven off, an equal weight of fine white flour is then added, and finally 15 g. of cane-sugar dissolved in 300 c.cm. of warm water, the whole being boiled, filtered, and added to cows' milk. The proportion of the latter varies with weight and age, the general principle being to procure a diet with the same protein percentage as that of human milk, but possessing a high caloric value due to fat and carbohydrates in a form which is readily digested. The optimistic references to this diet which have been made by its originators and other European observers are confirmed by J. P. C. Griffith in a recent publication[1] and it appears certain that many infants who have failed to thrive on more commonly employed formulæ have made excellent progress when fed with this mixture. It may be said that the success of any such system depends upon its conformity with certain general principles.

A diet found suitable for infants differs from one fitted for those in adult life in two great respects; it must first be adapted to a period of life characterised by growth rather than by the expenditure of physical energy; and secondly it must be acceptable to an alimentary canal not yet accustomed to the digestion and absorption of a large variety of foodstuffs. Probably too much attention has in the past been paid to the mere caloric value of the food supplied. Dr. G. B. Fleming has recently demonstrated[2] the truth of Finkelstein's teaching that an infant should be fed according to its expected rather than its actual

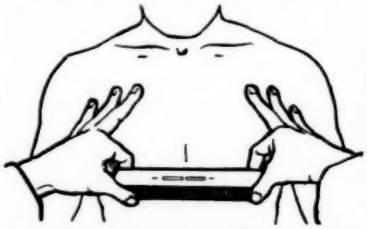
[1] Therapeutic Gazette, Dec. 21st, 1921, p. 773.
[2] THE LANCET, 1921, ii., 1165.

weight, the work being based upon studies of basal metabolism in infancy; but even such exact studies may be misleading if we concern ourselves too exclusively with the energy value of the food supplied. The importance of supplying nutriment for growth rather than for energy expenditure is certainly amongst the most pressing of the problems of the dietetics of infancy. In this respect it is surprising how frequently one still finds the term "protein" alone employed in discussions on the nitrogenous requirements of the young child. Griffith, in an otherwise excellent article, has made no mention whatever of the amino-acids upon whose presence or absence the whole suitability of many foods depends. The tendency of modern physiology is to show that the amino-acids are the ultimate units from which the protoplasmic molecule is built up, and the absence or deficiency of one particular type of amino-acid in any protein may result in an inability on the part of the organism to construct new protoplasm—just as the absence of a particular type of tile may make impossible the construction of a mosaic pattern. It is possible that herein lies the success of such work as that recently reported[3] by F. Tweddell, who, by the addition of egg-yolk to the milk, secured considerable improvement in the condition of marasmic babies.

We have recently had occasion[4] to consider the therapeutic possibilities of B-vitamin with special reference to its application to infant-feeding. It is not here our purpose to discuss the chemical composition of the vitamins; whether they be indeed amino-acids, or whether they be substances whose beneficent action is due to some direct effect on the living cells, it is clear that they possess a value altogether beyond their possible calorie worth, and are probably essential in the diet of any growing organism. The interest they are causing amongst those occupied with problems of baby feeding is evidenced by the rapidly increasing literature dealing with the subject: by pursuit of close lines of investigation we may arrive ultimately at a system of infant feeding established upon a truly scientific basis.

THE SPIRIT-LEVEL IN CHEST EXAMINATIONS.

ONE of the most accurate methods of detecting differences in the expansion of the chest on the two sides is to hold a spirit-level horizontally against the middle of the chest and to note the movement of the bubble in this instrument while the patient breathes. Like many other useful devices, this simple procedure has not enjoyed the popularity it deserves; perhaps it is too simple to be popular. In *Hygiea* for June last, Dr. C. E. Waller, under the heading "Retardatio Medica," describes the use of this instrument in the examination of the chest, and its special value in demonstrating lagging of the left side of the chest as a result of certain nervous impulses. The ends of the instrument are held between the first finger and thumb of the examiner's hands, the remaining three fingers of each hand being pressed against the patient's chest above the spirit-level at points equally distant from the centre of the chest and at the same level on the two sides. These six fingers being placed in the infra-clavicular fossæ, the instrument is set at the horizontal on the completion of expiration, and the movements of the bubble are watched as the patient inspires. Under normal conditions the expansion of the two lungs may be so symmetrical that the chest moves as if it contained only one lung. But if the patient is nervous, and this is so often the case as to be the rule rather than the exception, the condition which Dr. Waller calls retardatio medica—i.e., lagging of the left side of the chest—is observed. The phenomenon can be demonstrated on many healthy persons, and has to be discounted in estimating the significance of other forms of asymmetrical breathing. Thus, there may be pleurisy, pneumonia, or cavitation on the right side, tending to produce respiratory lagging on this side. But if the patient is subject to retardatio medica, it may be sufficiently marked to neutralise the effect of the pleurisy on the right side. Or it may diminish the lagging on the right side but not neutralise it altogether. On the other hand, if the left side of the chest is diseased, the retardatio due to this cause is apt to be exaggerated by retardatio medica; it may therefore be advisable to wait till the retardatio medica has passed off before gauging the degree of retardation due to organic disease on the left side. The value of the spirit-level can be demonstrated in a case of hæmoptysis when the physician wishes to learn from which lung the blood comes. But unless he is alive to the significance of retardatio medica, he may fail to detect the retardation which hæmorrhage from a lung sometimes provokes.



[3] Medical Record, 1921, p. 935. [4] THE LANCET, 1921, ii., 1228.

TREMOR DURING ANÆSTHESIA.

THE tremor which is sometimes seen during anæsthesia, generally when ether is being used, although not a serious symptom, may cause much inconvenience to the surgeon. It is rarely evident when narcosis is deep. Commonly it is started by some alteration in position, particularly of the lower limbs. Physiologically it appears to be of the nature of a reflex clonus. At the hospital of Vestervik, Sweden, a number of observations[1] have been made by Dr. T. Rietz, which led him to attribute the phenomenon to cerebral excitation brought out by the narcotic circulating in the blood. He conceived the idea that, if this were the true causation, pressure on the carotid might influence the symptoms. Trying this treatment he found that out of 33 subjects who displayed the tremor, this was immediately stopped in 19, imperfectly in five, and the pressure was without effect in five. The pressure must be strong, he says, and sometimes bilateral. Pressure exerted elsewhere, for example, on the brachial plexus, was without effect, and Rietz believes therefore that the result achieved by compression of the carotid is not due to reflex from the painful stimulus caused, but to actual pressure on the artery. It is permissible to doubt whether the symptom deserves the treatment. In most instances the tremor is quickly overcome if narcosis is deepened and the faulty position temporarily rectified, or if ether is given up in favour of chloroform for a few moments. But the observation is of physiological interest, and deserves further attention.

PALPABLE RADIAL ARTERY.

THOUGH palpability of the radial artery is considered an important sign in assessing the condition of the vascular system, its frequency and the conditions under which it is observed do not appear to have been much investigated. Sir Clifford Allbutt, in his great work on "Diseases of the Arteries," states that palpable radials are frequent in those who do heavy physical work. In the *Medical Journal of Australia* of Dec. 3rd, 1921, Dr. G. C. Willcocks has published an important paper based on the examination of the radial arteries of 104 healthy soldiers and 77 ex-soldiers suffering from neurasthenia. Of the former, whose ages ranged from 18 to 50 years, the radial artery was found palpable in 85 per cent.; in 15 per cent. it could not be distinguished from the surrounding tissues, but in six of the men a thick forearm or proximity of the vessel to the flexor tendons prevented a definite conclusion as to whether the vessel could be palpated or not after the radial pulse was obliterated. In 13 per cent. the artery felt

[1] Bull. Société de Biologie, Dec. 17th, 1921.

very thick. Of the neurasthenics 92 per cent. had palpable radials, and in 8 per cent. the artery could not be felt. In 40 per cent. the artery was much thickened. In the majority of the men there was no obvious difference between the arteries on the two sides. Of 87 soldiers with palpable radials 48 had some infectious disease since childhood, and 40 were under the age of 26 years. The artery was markedly palpable in healthy soldiers of 18, 19, and 22 years. In only three men was there a history of alcoholism, and these had palpable radials. In 25 healthy soldiers under the age of 22 years it did not seem that heavy work could have been responsible for the palpable radials. It has been stated that spasm or hypertonus may render the radial artery temporarily palpable, but it was difficult to believe that hypertonus could be the cause in so many men. In three cases an endeavour was made to eliminate spasm by immersing the forearm in water as hot as could be borne, but the radials remained just as palpable. They were more frequently and more markedly palpable in the neurasthenics, especially in those whose symptoms were of long standing. The systolic blood pressure (taken with Lauder Brunton's sphygmometer) in healthy soldiers was about 130-40. The pressure differed little in those whose arteries were markedly palpable, just palpable, or not palpable. The pressure did not vary with the palpability of the artery, or at all constantly with age.

THE HISTORY OF HUMAN DISSECTION.

IN his first professorial lecture [1] at Lyons Dr. A. Latarjet told the history of anatomical investigation, paying eloquent tribute to his master, Testut, whom he succeeds in the chair of anatomy. The student of to-day is so much engaged in gathering in the latest views, that he can spare few moments to listen to the echo of the voices of the past. 'Tis true, 'tis pity, and we must make the best of it, but the students of Lyons should be grateful for the glimpse given them of the great antiquity of the science they study. Prof. Latarjet distinguished three great periods in anatomy: his first period extending from remote times to the downfall of the Western Roman Empire; his second, including Harvey, from the thirteenth to the seventeenth centuries, a period marked by increasing perfection in knowledge of detail, technique, and application of experimentation; the third, the age of evolution, of scientific grouping and blending of biological sciences, of study of human races with the wider application of anatomy to clinical and pathological conditions. The large part played by France in the two later periods was naturally and justly insisted upon. England, which scarcely entered the world of medicine before the thirteenth century, may herself claim a preponderating share in the same periods, although we fear that many of the names of the men who wrought so well are unknown to present-day students. Harvey—"Your Anatomist," as he styles himself in addressing his College—occupies a position which is unique. Judging his work by its results, it has had more influence on medicine, in the large sense, than any other: it swung the ship round on a different course. Had Galen, writing on the heart valves described by Erasistratus, but seen the truth by intuition, it is impossible to imagine what the science of medicine might have been like to-day. Harvey, however, was not the first anatomist to use experimental methods, although Prof. Latarjet appears to suggest this when he assigns such "new methods" to the time of Harvey, Aselli, and Pecquet. Galen would still rank to-day among leading exponents of experimental physiology by his boldness, clearness, and judgment, but his preconceptions closed his eyes to much that was before him; like us he only saw that which he was prepared to see. It was owing to Galen's experimental work on dogs and swine that his anatomical views of the human subject were mingled with those properly belonging to the structure of such animals, but we doubt whether Prof. Latarjet is justified in denying that Galen or others of his age practised human dissection. Le Clere holds the reasonable opinion that Galen certainly, if only occasionally, dissected the human body. The remark of Seneca about physicians opening bodies to ascertain cause of death, and the record of Hesychius that "Hermogenes, the rhetorician, having died was dissected," are in proof of human dissection in ancient times. Nor is there any special reason for thinking that the opportunities open to Herophilus in the early Ptolemaic time became obnoxious to the later Ptolemaic spirit. When this line came to an end, however, and Egypt became a Roman province, no doubt popular feeling as well as Roman law went against the practice. Hence the difficulties which Galen had to surmount, as is apparent from his writings. In Arabian medicine there was no practice of dissection. It was occasionally undertaken at Byzantium, where the Eastern Empire still lingered gorgeously, but the religious forces were strongly against its recognition, and it was probably only performed in secret. During the pre-Renaissance period swine were in extensive use for anatomical teaching, and even as late as the sixteenth century we know that Berengarius gave his first anatomical demonstration on the body of a hog in the house of Albertus Pius. Religious obstruction was potent before the days of the more liberally-minded Popes; yet it is hard to believe that the wider views of the Benedictines, for example, which led them to foster the growth of the school of Salernum, did not at the same time show them the necessity of studying the structure of man—the subject of the science of medicine, as old Mondinus has it. The same Mondinus, writing in the fourteenth century, gives the first manual for human dissection, referring on occasion to the pig by way of contrast. There are hidden rooms in some of the old universities said to have been used for human dissection, and recent research suggests that certain malefactors were handed over alive for this purpose during the fifteenth century. It may, in fact, be said that human dissection was practised from the thirteenth century, when the law of Frederick II., regulating the training of medical men (1213), insisted on a course of human anatomy and provided for the same. Ever since dissection has been a recognised road to knowledge.

[1] Paris Médical, Nov. 26th, 1921.

PRIMARY TUBERCULOUS PERICARDITIS.

ALTHOUGH some authorities have categorically denied the occurrence of a primary isolated tuberculous pericarditis, apart from glandular or other lesions, from time to time cases are reported in which a clinically primary pericarditis has been established post mortem, being found to be associated with no other discoverable trace of tuberculosis elsewhere. In a paper recently published, Dr. Carl A. Hedblom,[1] after briefly abstracting eight such cases reported in the literature since 1897, gives details of a case personally observed at the Mayo Clinic. In this patient, a man of 36, the clinical diagnosis was based on the chronicity, the recurrence of effusion after repeated aspiration, the history of recent exposure to tuberculous infection, and the absence of any other recognisable disease. Pericardiotomy was performed under local anæsthesia, partly in the hope that an open operation might prove curative on the analogy of a simple laparotomy in tuberculous peritonitis, and 2000 c.cm. of sero-purulent fluid were evacuated. Although guinea-pig inoculation of the exudate gave a negative result, a section of the pericardium, examined microscopically, showed unmistakable tuberculosis. Immediate relief was obtained from the operation, but there was a recurrence of the effusion, and six weeks later pericardiotomy was again performed, and a similar quantity of fluid evacuated. Convalescence from this second operation was complicated by thrombo-phlebitis of the right jugular

[1] The Surgical Clinics of North America, October, 1921.

and subclavian veins, a result possibly due to the presence of bacilli in the blood stream. Hedblom is of the opinion that tuberculosis is probably a much more frequent cause of pericarditis than is generally recognised; he believes that most cases of pericarditis that cannot be proved to be pyogenic are tuberculous, although they are usually secondary to a tuberculous lesion elsewhere.

SIGNIFICANCE OF CARBON DIOXIDE IN EXPIRED AIR.

IT becomes increasingly apparent that a modification must be made in existing views concerning the function of the CO_2 present in the blood and alveolar air. The old view, which regarded CO_2 as a poisonous gas, has long been abandoned by all but the general public, and has been replaced by the theory that the gas is an end-product of metabolism which circulates in the blood, where its presence serves as a stimulus to the respiratory centre and hence leads to its automatic excretion from the body via the pulmonary capillaries and alveolar air. Such is the view which, we believe, is held at the present day by the majority of medical men, and by many pathologists and physiologists in this country. It is a theory which coincides with remarkable accuracy with published observations on CO_2 excretion in relation to exercise; in such circumstances it has been shown that the increased formation of CO_2 is accompanied by an increased excretion of the gas, but that the pulmonary ventilation is so adjusted that the tension of CO_2 in the alveolar air maintains an approximately constant level.

A similar constancy of the alveolar CO_2 was thought to exist whilst the body was at rest, but evidence begins to accumulate which shows that this is not the case. The latest contribution to this subject is from the medical clinic of the University of Vienna, where H. Essen, F. Kanders, and O. Porges have made a series of observations[1] dealing firstly with the relation between the alveolar CO_2 tension and gastric digestion, and secondly with its relation to the chlorides of the blood serum. Their method has consisted in observations of CO_2 tension taken before, and one hour after, a meal consisting either of tea and zwieback, or else an ordinary hospital dinner. In cases in which there there was a secretion of HCl by the stomach, and notably in cases of pyloric stenosis due to gastric ulcer, they observed a marked increase in the alveolar CO_2 tension after the meal: in cases with achlorhydria, especially in a case of pernicious anæmia, and in cachectic subjects with carcinoma of the stomach, no such rise in tension occurred. The increase of CO_2 tension in the alveolar air, which must represent an increase of tension in the blood, these observers explain as being due to the loss of Cl-ions which occurs during the formation of HCl by the secretory cells of the stomach. Such loss of Cl from the blood will liberate Na, which binds CO_2 to the bicarbonate of the blood, increasing the fixed alkali; this would necessarily upset the ratio $CO_2/NaHCO_3$ and cause a lowering of the H-ion concentration of the blood, were not more CO_2 kept in the blood in order to maintain neutrality. It is this neutrality regulation which they regard as the essential function of the alveolar CO_2 during rest. Their work gives confirmation to that published recently in this country by E. C. Dodds and T. Izod Bennett. Following the observation of E. C. Dodds[2] that the CO_2 tension in a resting subject remains constant until he takes a meal, when it at once undergoes an increase, followed by a fall, the English workers, by means of parallel observations on gastric and respiratory analysis, have shown[3] that the curve of CO_2 tension after a meal rises quantitatively in accordance with the degree of gastric secretion. Still more recently they have brought forward evidence[4] to show that the fall in CO_2 tension which occurs at a later stage corresponds to the secretion of alkali by the pancreas; this fall was not observed by Porges and his co-workers, but could hardly have been recognised with their method, which involved examination of only one specimen after the test-meal.

We recently published[5] a communication from E. C. Dodds, showing how the method may be applied as a means of investigating gastro-intestinal secretion in pathological states, the changes in tension being often of considerable degree. From all these observations it becomes clear that CO_2 can be regarded neither as a poison nor as a mere waste-product, but rather we must look upon it as a body which, owing to its being both volatile and an acid, provides us with a means of rapidly restoring to the blood any acid lost during gastric digestion, and of eliminating acid from the blood whenever katabolic increase, abnormal acid production, or loss of alkali has tended to shift the reaction of the tissues towards the acid side.

[1] Deutsch. med. Woch., Nov. 24th, 1921, p. 1415.
[2] Journ. of Physiol., 1921, liv., 342.
[3] Brit. Journ. of Exper. Path., 1921, ii., 58.
[4] Journ. of Physiol., 1921, lv., 381.

EXPERIMENTAL STUDIES ON HYDROCEPHALUS.

THE December issue of the *Johns Hopkins Hospital Bulletin* contains an instructive paper by Dr. J. C. Nanagas on the experimental production of internal hydrocephalus and, more particularly, on the interesting problem of the absorption of the cerebro-spinal fluid from the closed ventricular system in that condition. Recent work standing very largely to the credit of the American school of experimental physiologists has shown that intravenous injection of a hypertonic solution of common salt invariably produces a marked reduction of the pressure of the cerebro-spinal fluid, whereas, conversely, injection of a hypotonic solution (say, distilled water) is followed by a pronounced and sustained rise. Dr. Nanagas took advantage of these well-established phenomena in an attempt to solve the still not completely understood question of the routes whereby the fluid returns to the general circulation. His procedure was to follow the technique devised by Weed for the production of internal hydrocephalus, consisting of the intraventricular instillation of a 10 per cent. suspension of lamp black in physiological saline after withdrawal of as much cerebro-spinal fluid as possible. The animals employed for the purpose were kittens. After a varying period of from two days to two weeks it was a simple matter to demonstrate the establishment of a well-marked internal hydrocephalus by this means. Manometer records showed the pressure of the fluid in the experimental kittens to average some 50 mm. higher than the normal. The next step was the employment in these hydrocephalic animals of intravenous injection of hypertonic and hypotonic solutions respectively; with the former a brief initial rise in intraventricular pressure was succeeded immediately by a marked depression, even to the production on occasion of negative values. Dr. Nanagas considers the phenomenon is to be explained by the rapid absorption of the fluid from the dilated cerebral ventricles. In the case of hypotonic injection, of distilled water by the intravenous route, this was invariably followed by a marked and sustained increase in cerebro-spinal fluid pressure. It is thus clear that, closed ventricular system notwithstanding, the contained fluid can be quickly dispersed and quickly increased, in each case within less than half an hour from the time of the intravenous injection.

To determine the path or paths of the dispersal of the fluid the technique elaborated by Wislocki and Putnam was adopted. The intraventricular fluid was withdrawn from the artificially produced hydrocephalic cavities, and for it a solution of equal parts of 1 per cent. each of potassium ferrocyanide and iron ammonium citrate was substituted; this in turn was quickly followed by the intravenous injection of hypertonic salt solution, both in hydrocephalic animals and in a series of normal kittens by way of control. Other animals, both hydrocephalic and normal, received the same ferrocyanide-citrate solution intraventricularly without subsequent injection of hypertonic salt. After two hours the kittens were killed and the tissues

[5] THE LANCET, 1921, ii., 605.

fixed by aortic injection of a solution consisting of 10 per cent. formalin with 1 per cent. hydrochloric acid, the latter causing prompt precipitation of Prussian blue granules in situ and so supplying exact evidence, by the distribution of the granules, of the course taken by the escaping ventricular fluid. Macroscopic and microscopic examination of the prepared specimens showed conclusively that a blue precipitate was massed against the ependymal wall of the ventricles and penetrated the surrounding brain substance in zones of diminishing intensity, being most abundant just beneath the lining ependyma of the lateral ventricles. Here the blue granules were seen to be lying against the external surface of the endothelial wall of the capillaries; further away the vessels possessing blue granules were identified exclusively as veins. Very fine precipitate was also observed in the cytoplasm of the ependymal cells and to a certain extent between them; in no specimen was it found within the epithelium of the choroid plexuses or in their capillaries or in larger vessels entering or leaving. In the series of normal (i.e., non-hydrocephalic) animals, absorption of intraventricular fluid was similarly found to have taken place through the ependyma, though the process was evidently very slow, and its physiological significance under normal circumstances is therefore perhaps relatively unimportant.

Dr. Nanagas's findings are of considerable value for the neurologist, supporting and extending as they do the conclusions of a few previous observers that cerebro-spinal fluid escapes from the ventricles by other means than the accepted arachnoid villi route. Anatomical and physiological proof of the absorption of the fluid via the ventricular ependyma into the subependymal capillaries is now definitely furnished. Though no application of his researches to clinical medicine is, in this paper, advanced by Dr. Nanagas, they have obvious bearing on the problem of disseminated sclerosis, in which subependymal and peri-aqueductal sclerosis is very frequently found. Moreover, it has been recently suggested by Kinnier Wilson that the common and early occurrence of the Argyll Robertson pupil in neurosyphilis is due to a filtration of the virus or toxin from the cerebro-spinal fluid system through to subependymal (in this case peri-aqueductal) tissues and fibres, and in Dr. Nanagas's figures a peri-aqueductal spread of Prussian blue granules is very clearly shown.

ANTHRAX AS AN INTERNATIONAL PROBLEM.

SOME alarm was caused in England during 1915–16 by the occurrence of a series of cases of external anthrax, said to have been due to the use of infected shaving brushes. Although the alarm abated with the decline of the outbreak, no cases being reported in 1917–18, it was renewed by the appearance of a fresh series during 1919–20, the origin of which was again attributed to shaving brushes. It is common knowledge that certain imported commercial animal products, such as wool, hair, skins, and bones, are liable to convey anthrax infection to the workers who have to handle them; to avert this danger and to protect the operatives certain precautions are prescribed by law in this country. Another class of persons who are exposed to anthrax infection are dock labourers when engaged in unloading cargoes of hides and skins, which are carried on the shoulders of these men from the ship to the shore. All nations do not take precautions similar to those prescribed in this country, and little control can be exercised over certain Asiatic countries as to the conditions under which infected animal products are exported to Europe. For some years the danger of imported articles infected by anthrax has engaged public attention in this and other countries. The International Congress of Industrial Hygiene discussed the question at Milan in 1906 and again at Brussels in 1910. The International Association for the Legal Protection of Workers appointed a committee in 1912 to consider what were the best prophylactic measures to prevent the risks of anthrax in certain industries. The International Labour Conference at Washington in 1919 considered the question and renewed the discussion at the Geneva Conference in 1921. So far, these international efforts have not succeeded in finding a definite solution of the difficulties associated with the subject, but much help has been afforded by the labours of a departmental committee, appointed by the Home Secretary, which was engaged in investigations and experiments from 1913 to 1918. Much attention was given by this committee to processes for the efficient disinfection of wool, hair, and other animal products.

In the November issue of the monthly *Bulletin* of the Office International d'Hygiène Publique the whole subject has been reviewed at considerable length, and a vast amount of information summarised showing the present state of our knowledge of anthrax, industrial and agricultural, when a plea is entered for international coöperation in devising and carrying out suitable measures to prevent the spread of the infection. It is commonly admitted that imported animal products from Russia, Persia, India, China, and Siberia are often infected and that special measures should be applied to material coming from these countries. It has been proposed that disinfecting stations in each of these countries should be established at certain ports where cargoes of animal products are embarked for conveyance to Europe, and that guarantees of efficient disinfection should be given, with a certificate signed by a competent bacteriologist who has applied proper tests, before the bales or packages are allowed to be taken on board ship for exportation. Another proposal has been that the British Government should set up disinfecting stations at its own ports, and on a sufficiently large scale to deal with the great quantities of wool, hair, and hides which arrive in this country from abroad; but there are many difficulties in carrying out this suggestion. Already in England much has been done by efficient disinfection to prevent the risks of anthrax infection in the manufacture of wool and hair. As an illustration of the need for efficient disinfection, the history of the two outbreaks of anthrax in England caused by shaving brushes deserves consideration. Before the war we got cheap shaving brushes from Germany. In 1914, this source of supply being closed, a London firm which had purchased in 1912 a parcel of hair from China and kept it in stock sent a portion of it to a factory in the Midlands to be made into shaving brushes, another portion being sold to a New York house. The parcel sent to the Midlands was labelled "goat's-hair," though much of it was horse-hair. As goat's hair does not come under the regulations requiring it to be disinfected before manufacture, although horse-hair does, the hair was not disinfected. From March to August, 1915, 25 gross of these shaving brushes from the Midlands factory were sent to London and were distributed by the firm to many vendors in town as well as in the provinces. The first case of anthrax due to the use of these brushes occurred at the end of June, 1915, and was followed shortly afterwards by others. Up to the end of 1916, 19 cases, 10 fatal, had been reported, and all were attributed to the use of the brushes. Investigation on behalf of the Local Government Board was made by Dr. F. J. H. Coutts, who confirmed the incrimination of the brushes in the anthrax outbreak. The presence of anthrax spores in the brushes was bacteriologically proved. Efforts were at once made to stop the sale of the brushes and many were privately destroyed by their alarmed owners. Among the British troops in France from 1915 to 1917 some 28 other anthrax cases were said to have been due to infected shaving brushes. No further cases occurred in England during 1917–18, but a fresh outbreak was reported during 1919–20, comprising 31 cases, of which 12 were fatal, ascribed to shaving brushes of Japanese manufacture.

When the German supply of cheap shaving brushes was stopped, Japanese merchants began to manufacture a similar article at a low price with hair

imported from China. It was alleged by the Japanese that the hair used for the brushes had been disinfected, but bacteriological evidence in our own country showed that many samples examined contained virulent anthrax spores notwithstanding the fact that the brush was wrapped up in a Japanese certificate stating that it was free from infection. As soon as it was found that these brushes were causing anthrax endeavour was made to stop their sale. Of one consignment of 40,000 brushes 30,000 were recovered and many others were destroyed by their owners. Their importation into this country was forbidden early in 1920, and after this the outbreak subsided. It is of interest to mention that the Canadian Government purchased 200,000 shaving brushes for their troops from a New York firm, and that some cases of anthrax were traced to the use of these American brushes. In the training camps of the troops of the United States a series of anthrax cases numbering between 40 and 50 were reported during 1918, and their origin was attributed to the use of new shaving brushes, samples of which when submitted to a bacteriological examination proved to contain virulent anthrax spores. The Americans and the British were the chief sufferers, being the two nations where shaving is almost universal.

SUTURE OF ARTERIES.

PROBABLY few surgeons are familiar with the technique of the anastomosis of blood-vessels. This is due not to neglect, but rather, as is shown in an article by J. M. Neff,[1] to lack of opportunities. This writer claims that any good surgeon should be able to suture an artery as readily as he would a stomach or intestine, and then seems to render the claim nugatory by making it clear that conditions suitable for the anastomosis of blood-vessels are hardly ever found. The technique of doing an end-to-end anastomosis between artery and vein was of evident importance when direct blood transfusions were still being performed, but this operation is not even mentioned by Neff and certainly is seldom used at the present time. Injury to a blood-vessel, as in gunshot or stab wounds, might be a more frequent indication, were not the presence of any bacterial infection an almost certain cause of failure. End-to-end suture might sometimes be made necessary by the removal of a growth involving a large blood-vessel, but here another cause of failure—namely, tension—is likely to be introduced. Arterio-venous anastomosis done for embolism, thrombosis, senile gangrene, or Raynaud's disease, almost always fails. The few occasions, in fact, in which arterial suture will be called for are almost limited to closed fractures complicated by injury to a large vessel and to accidental injuries inflicted during the course of surgical operations. Even here the example given by Neff is perhaps unfortunate, for a surgeon who injures the femoral artery during an operation for hernia is unlikely to perform successfully the delicate operation of arterial suture. Nevertheless the claim made by Neff that suture of blood-vessels should be readily performed by any good surgeon is not invalidated by this restriction of its field of usefulness. The value of the article lies in its demonstration of the principle, so often found to hold good in surgery, that the best method is the simplest. The technique associated with the name of Carrel should be adopted to the exclusion of all others. Some form of arterial clamp is necessary; beyond this no instruments are needed more special than fine scissors, dissecting forceps, and sewing needles. Thin silk impregnated with paraffin is the best suturing material. Redundant adventitia is cut away from the vessels so that clean ends are obtained. Three equidistant sutures are then inserted and tied, and these are used as "guy-ropes," with the help of which a continuous suture is put all round the circumference of the cut ends, so that accurate apposition is obtained. Delicacy of manipulation and asepsis should make this technique sure of success in the hands of any reasonably skilful surgeon.

[1] Surgery, Gynecology, and Obstetrics, December, 1921.

THE DROUGHT.

A HEAVY snow-fall soaking gently into the ground may help to replenish the ultimate springs of water in six months' time or more. The article which appears on page 148 draws attention to the present shortage of water in England and Wales, which is inconvenient and disquieting, if not actually serious at the moment. The public supply of water in such a city as Bristol is turned off from 4 P.M. to 7 A.M.; Boston, Lincolnshire, is in dire straits; Wetherby has found it necessary to arrange for a supply from Leeds; and in various parts of Yorkshire where water is usually plentiful it is now being sold at 1*d.* a bucket. It is natural for the rainy West and the Pennines not to take a serious view of the water shortage, and Devon is actually considering a project to harness the water power of Dartmoor to supply electricity throughout the county; while in the Nid Valley the new Scarhouse reservoir for Bradford city is to be built by means of turbines actuated by water power from higher up the valley. Our special correspondent touches on the obvious duties of the citizen in regard to economy in the use of his public supply of water. It is encouraging to note that the shortage is not a world shortage, for in the report of the New South Wales Metropolitan Board of Water Supply, which has just reached us, the yearly rainfall for 1920–21 at each of the 11 observation stations was so abundant as to exceed the average for past years by 30 per cent. or more.

GASTRIC ULCER AND TABES.

IN a paper read before the Section on Gastro-Enterology and Proctology at the last meeting of the American Medical Association, Dr. Burrill B. Crohn,[1] of New York, calls attention to the fact that a fully-developed gastric or duodenal ulcer may be present in tabes, although the discovery of such characteristic signs of tabes as the Argyll-Robertson pupil or the absence of deep reflexes may lead the practitioner to ignore the possibility of a coexistent abdominal lesion. The percentage of cases of tabes accompanied by gastric ulcer would be difficult to estimate, and in a general hospital in New York neurological cases as such are not treated in medical wards. While admitting that the presence of a gastric or duodenal ulcer in tabes may be a pure coincidence without any causal connexion between the two conditions, Dr. Crohn offers the following explanation of the association. Cerebro-spinal syphilis is accompanied in a large proportion of cases by gastric hypersecretion. Organic lesions of the spinal cord or brain often cause delayed gastric motility and probably gastric peristalsis, these two conditions presumably predisposing to gastric or duodenal ulcer. Syphilitic aortitis may also play a rôle. Dr. Crohn has been unable to find any reference to syphilitic ulcer or gumma of the stomach or duodenum in a tabetic subject suffering from gastric crises, and expresses the opinion that the ulcers found in tabes are probably simple peptic and not syphilitic ulcers, or syphilis of the stomach. Three illustrative cases are recorded in the quoted paper. The first was one of violent tabetic crises, with symptoms very suggestive of gastric ulcer, the existence of which, however, could not be established. The second was a case of tabes, with predominant gastric symptoms, and an apparent duodenal ulcer. In the third case advanced tabes was associated with vomiting, hæmatemesis, and melæna due to an active bleeding duodenal ulcer.

AT the social evening to be held on Jan. 25th at the Royal Society of Medicine Prof. Elliot-Smith will deliver a short address at 9 P.M. on the Rhodesian Skull.

[1] Journal of the American Medical Association, Dec. 24th, 1921.

MEDICINE IN THE IRISH FREE STATE.

(BY OUR DUBLIN CORRESPONDENT.)

THE change of government which is at the moment taking place in Ireland is fraught with issues of great importance to the medical profession of this country. On the one hand, there is all the disturbance inherent in a period of transition. New masters are replacing old, and, however well-intentioned they may be, they lack the experience of those who have hitherto held the reins in Ireland. On the other hand, Ireland will be, for the first time since sanitary science has taken a place in governmental activity, under the rule of an authority directly responsible to the people of the country. Health problems in one country differ considerably from those in another, and it has long been the complaint of those interested in health reform in Ireland that legislation at Westminster tended to give her, not what those who knew Ireland thought most suitable, but what those who did not know Ireland thought ought to be suitable. This complaint can no longer be made, and social problems in Ireland, including those affecting health, must in future be solved by an assembly directly responsible to Irish public opinion. It will be for the medical profession of the country to make sure that as far as health is concerned public opinion will be properly instructed. On the whole, then, one can be hopeful as to the future of public health in the Free State; for the disadvantages of the present change are likely to be temporary, while the advantages promise to be permanent.

The Backwardness of Irish Sanitation.

In regard to matters of public health Ireland is far behind other civilised countries. There are, in fact, only two whole-time medical officers of health in the country—those for the cities of Dublin and Belfast. Sanitary work in the other towns is in the hands of part-time medical officers whose salaries are inconsiderable, and the system suffers from all the disadvantages which are bound to arise when the medical officer of health makes his living out of private practice. In the country districts the position is much worse. The Poor-law medical officer is ex-officio medical officer of health for his own district. He has no special sanitary training, and as his salary as health officer is nominal—£5 to £20 a year—he is not expected to perform any but nominal duties. It is clear that in the field of public health there is ample scope for development.

The public medical service has long been calling loudly for reform. The grievances and inconveniences and lack of adequate remuneration have rendered those engaged in the service discontented, and its connexion with the hated Poor-laws has rendered it unpopular with the people. The association of district hospitals with the workhouses has prevented them being used to any extent otherwise than as "sick bays" of the workhouses to which they are attached. It is hardly necessary to recapitulate the faults which call for attention in every branch of public activity bearing on health. The housing question is pressing, particularly in Dublin and Belfast, but also in small towns throughout the entire country. There is no medical inspection of schools, although a law making it compulsory was passed in 1919. The county infirmaries are in need of reorganisation as modern hospitals. The asylums and the asylum medical service need close attention. All these facts have been recognised for decades, but nothing has been attempted. The report of the Irish Public Health Council, which was presented to the Government in the early summer of 1920, suggested a systematic scheme of reform which dealt with all these questions, but no action was taken on it.

The Responsibilities of the New Régime.

There is good reason to believe that those who will constitute the Irish Government in the near future realise to the full the need for a thorough scheme of health reform, and are likely to make it one of their first legislative measures. Already, under circumstances the difficulties of which could hardly be exaggerated, the executive of Dail Earann had undertaken considerable reforms in the Poor-law system and in the public medical service. In the areas in which local authorities recognised Dail Earann, the Poor-law unions had been amalgamated, the workhouses had been abolished, and the hospital accommodation concentrated into county hospitals. The Poor-law and medical services for each county had been put under the control of a county board of health. In the main the scheme was sound, resulting in greater efficiency and less expenditure. It followed closely on the lines laid down in the report of the Irish Public Health Council, with one important exception. The Health Council did not suggest the abolition of district hospitals, and it is precisely in its departure from the report in this particular, and in closing down of the district hospitals, that the scheme of Dail Earann has encountered most criticism. The formulation of the scheme, however, and the energy used by the Local Government Department in pressing it on the local authorities are evidences of the keen interest taken by members of the Government in the health of the people. Moreover, the Labour Party in Ireland, which is likely to be a strong force in Irish politics in the future, is not overlooking the importance of health. It is stated that, with expert help, a committee of this party is studying the health question with a view to drafting a definite policy.

The Prospects of the Medical Profession.

All this is for the good, and medical men in Ireland can look forward with hope to a Government willing and anxious to improve the health of the country. Also it is not doubted that the Government will be willing to be guided largely by medical advice in health matters, but it is unfortunate that the organisation of the profession is still in a very imperfect condition. Neither of the existing associations—the Irish Medical Association or the British Medical Association—is strong enough in membership to speak for even a majority of the profession, and there is danger that at a moment when grave decisions are being made affecting both the interests of the profession and the health of the community, the voice of the profession may be inarticulate. It is then that the *deus ex machina*, the Irish Medical Committee, can again be invoked, and in the circumstances, that is probably the best that can be done.

The setting up of an autonomous Free State in Ireland affects the future status of the entire medical profession of that country. But it is suitable that the Irish Government should take under its supervision the keeping of the medical register of Ireland, for it could hardly permit so important a matter to remain in the hands of a body which is departmentally subordinate to the English Privy Council. With a separate Irish register the question will immediately arise as to the status of practitioners on that register who leave Irish shores. At present a large proportion of Irish medical graduates and licentiates seek a living in England, in the Dominions, and in the services. No doubt in the future Ireland will attract a larger number of her sons to remain at home, but the interests of those who wish to emigrate must be protected. Fortunately, it should not be difficult to arrange a measure of full reciprocity between the British and Irish registers, so that those on the register of either country should be at no disadvantage in the other.

PORTSMOUTH HOSPITAL: THE ROYAL MARRIAGE.—At a meeting convened by the Mayor, held at the Town Hall, Portsmouth, it was resolved to commemorate the marriage of H.R.H. Princess Mary and to open a Shilling Fund; the money thus raised to be devoted to various improvements at the hospital, and to present an illuminated address to the Princess, stating what had been done. By adopting a shilling fund, it is hoped that a very large number of the inhabitants will be induced to subscribe.

DRUGS IN COMMON USE IN UROLOGY.

THE urinary system lends itself to medication, for drugs are secreted by the kidneys to a greater extent than by other organs, and drugs so excreted, or injected directly into the urinary passages, come into close and sometimes prolonged contact with the organs which form the system. In the lungs and the skin there is relatively little excretion of drugs and the area over which it occurs is large. The intestine tends to absorb drugs which we would like to act locally, and it is difficult to ensure that the required action takes place at the right spot.

A paper[1] by Dr. Hugh H. Young, of Baltimore, on the Value of Drugs in Urology, reminds us that the large class of urologists in America deals with a broader field than the much smaller number of British genito-urinary surgeons or of physicians who specialise in diseases of the kidney. But as we recently noted, the Section of Urology of the Royal Society of Medicine is enlarging this session the scope of its view. Dr. Young discusses the value of drugs used in his own practice and tabulates the frequency with which they are used by other leading urologists. An account of the drugs described is of interest generally and also as showing the practice in America.

Urinary Disinfectants Given by the Mouth.

Hexamine.—Emphasis is laid on the necessity of the patient taking little fluid, so as to concentrate the drug, and on keeping the urine acid; if the urine is not acid then the active agent, formaldehyde, is not liberated. The total dose for the day is 60 to 90 gr. and 5 or 10 gr. of acid sodium phosphate may be taken every four hours between the doses of hexamine.

Oleum santali is perhaps the best of the volatile oil antiseptics and is still popular in acute gonorrhœa.

Chlor-mercury fluorescein, a compound from which phenol sulphonephthalein is eliminated in the urine, has been given by the mouth, and acriflavine and proflavine have been injected intravenously in rabbits, and both have produced antiseptic urine without injury to the animal.

Local Antiseptics in Urology.

Important factors in these are: the amount of albuminous precipitate formed, the diminution of the activity and the loss of penetrating power due to this precipitate, and the strength of the drug which can be used without irritation. The older the infection the more deeply will the infecting organisms have penetrated to the surrounding tissue. Of late there has been a great advance in our knowledge of the local treatment of chronic infections of renal pelvis, bladder, prostate, vesicles, and urethra.

Silver salts.—Silver nitrate is probably the most important antiseptic and caustic in chronic inflammations and ulcerations. The organic preparations, argyrol, collargol, and protargol are colloidal suspensions and are less irritant and only slightly astringent, but they penetrate little and have no strong germicidal power.

Potassium permanganate has a transient action and used in strengths of 1/2000 to 1/10,000 is not effectively germicidal; it acts owing to the nascent oxygen produced by its contact with protein material.

Various dyes have been used with some success, exercising a powerful and often strongly selective effect on bacteria.

Acriflavine and Proflavine.—Of these the former is more successful. It can be injected to the tract up to 1/1000 or can be used for irrigation to 1/5000. It does not coagulate albumin and its germicidal power is not diminished in the presence of serum, a fact which distinguishes it from other disinfectants. Its action depends on some unknown factors and a long exposure to its action gives the best results. Under favourable conditions it is the most successful drug in the treatment of gonorrhœa. Its lack of staining quality makes it especially useful.

Brilliant-green is also used in gonorrhœa.

Mercurochrome is a compound of fluorescein and mercury designed to have both the penetrative power of the dye and the germicidal activity of the mercury. It does not coagulate albumin, but its activity is somewhat reduced in the presence of serum. It is comparatively non irritating and is borne by the urinary tract up to 1 per cent., at which strength it will sterilise a foul, badly infected bladder remarkably. Its intense deep-red staining power is a great objection. Dr. Young thinks other drugs of this class will be brought out shortly.

Potassium mercuric iodide does not precipitate albumin: it is irritating if used in strong solution, but for irrigation purposes in very weak solution it is more germicidal than is potassium permanganate.

Soap.—The effectiveness of soap in venereal prophylaxis has long been known, and it has recently been shown that sodium oleate, especially if combined with a little boric acid when albuminous matter is present, is quite an active germicide for the gonococcus, killing it in 20 minutes at a dilution of 1/3000. Very weak solutions are effective in increasing considerably the germicidal power of other drugs against the gonococcus. It is tolerated by the urinary mucosa in the strength of 1 in 200.

Antisyphilitic Drugs.

The advantage of the combination of arsenic and mercury is insisted on. Great reliance has still to be placed in mercury and potassium iodide.

Mercury.—For intramuscular work mercurial oil and calomel are said to be far inferior, as regards absorption, to the salicylate which has largely replaced them. For quick action the cyanide given intravenously is to be preferred. Inunctions are still popular.

Arsenic.—A simple method of giving this drug is to inject neo-salvarsan (neo-arsphenamin) intravenously, making the solution by placing 2 c.cm. of sterile distilled water in the capsule itself and then withdrawing the solution from this into an ordinary hypodermic syringe. Possibly salvarsan (arsphenamin) is more positive in its results.

Sedatives and Anti-spasmodics.

Morphine and codeine relieve ureteral and vesical colic through action on the pain centres, but have a direct contracting and tonic effect on the ureter and bladder; another component of opium, papaverin, has a relaxing and anti-spasmodic effect on smooth muscle, and attempts have been made to aid the passage of calculi by injection through a ureteral catheter. Omnopon contains a large amount of papaverin and is given internally for colicky pains of all sorts.

Benzyl-benzoate is given in doses of 2–4 c.cm. of 20 per cent. alcoholic solution for subacute renal and vesical pains.

Hyoscyamus has a greater anti-spasmodic action than belladonna. A mixture containing potassium citrate and tincture of hyoscyamus is of unquestioned value.

Local anæsthetics.—Cocaine is not much used owing to the severe intoxication it sometimes causes. *Novocaine* (procaine) is only one-tenth as toxic as cocaine. It is used in the strength of 2–4 per cent. for examinations of the bladder and urethra or 1/400 for infiltration in operations. *Benzyl alcohol* is only 1/40 as toxic as cocaine and is used as local anæsthetic and for infiltration. In 2 per cent. strength it is distinctly antiseptic. A solution of 10 per cent. in olive oil may be injected through the drainage-tube in perineal prostatectomy into the depths of the wound and in this way the gauze packs may be painlessly removed.

Diuretics.

Water given in large quantities by mouth (10–12 quarts daily) is the simplest and best diuretic; it may be supplemented by saline solution injected under the breasts or given per rectum.

Caffeine is most efficient in cardiac dropsy, stimulating the heart and relaxing the vessels by direct action.

Theobromine and Sodium salicylate has a similar action, but has less effect on the central nervous system and is a better diuretic.

Saline diuretics.—Potassium acetate can be used in nephritis as it increases the solids in urine without irritating the kidneys; potassium citrate, being less readily absorbed is less diuretic and more purgative; magnesium sulphate, though largely purgative, is also a valuable diuretic from the small amount absorbed and should be the purgative chosen in cases of uræmia.

[1] Journal American Medical Association, 1921, xxvii., 1327.

CHADWICK PUBLIC LECTURE.—The next lecture will be given in February in London, on the Plague Question in Europe, by Prof. Van Loghem, M.D., of the Koloniaal Institut at The Hague.

OVERSEAS MEDICAL OFFICERS' DINNER.—The fourth annual dinner will be held at the Exchange Hotel, Liverpool, on Thursday, Feb. 9th, at 7.30 P.M. Tickets, price 16s., may be obtained from the Hon. Sec., Dr. G. F. R. Smith, 19, Queen's Drive, Mossley Hill, Liverpool.

WATER-SUPPLY AND THE DROUGHT:
HEALTH AND ECONOMIC CONSIDERATIONS.

(BY A SPECIAL CORRESPONDENT.)

IN the course of last summer the position created by the drought led us to a consideration[1] of the water-supply of the country and the need for safeguarding it. At the close of 1921 the continuance of the drought and the uncertainty of the future outlook make it desirable to supplement these observations, appreciation of which is apparent in the official circular (Dec., 1921) of the British Waterworks Association.

Husbanding the Supply.

Recently heavy rain has fallen in various parts of the country, and in some cases a certain amount of leeway has been made up. Elsewhere, however, the position remains grave, and may remain so in certain instances for a long time after the parched earth has received the most copious supplies of water. In gravitation supplies, with enormous storage reservoirs, full advantage can be taken of floods, although, even here, questions of the quality of the water impounded must be taken into careful consideration. In pumping schemes the same does not hold true, as the pumping capacity must bear a fairly close relation to current requirements to be economically sound.

For example, if water is being *lifted* out of a river into storage reservoirs, and the consumption is, say, 10 million gallons per day, it would be economically impossible to have a reserve of pumping power vastly in excess of that amount. It follows that when floods come the pumps can only deal with a limited quantity of the surplus water, which, in consequence, escapes seawards before it can be impounded in the storage reservoirs. Then again the flow of our rivers and the yield of our wells are largely governed by the immense body of underground water which has accumulated as the result of rain, which may have fallen many months previously. These underground reserves are like the fly-wheel to the engine, they tide over difficult periods, but there is a limit to their capacity and it may take a long time to reach a period of equilibrium. Many waterworks authorities have of necessity found themselves in the position of the gambler who recklessly spends his capital with little knowledge when his exchequer may be replenished.

Who really knows the present position of our underground sources of supply, how much rain will be needed to restore the balance, and how long it will take to reach a position of safety? The situation to-day is acute in many places, but even if we have copious rain to-morrow and in the days to come, it may be a long time before things revert to normal. Whatever happens, the whole of 1922 at least will be a period of anxious concern for many waterworks authorities.

[1] Water-Supply: Considerations Arising Out of the Drought. THE LANCET, August 13th, 1921, pp. 353–55.

The table and graph show the monthly returns for 1921 as regards temperature, rainfall, sunshine, and flow of River Thames.

Rainfall and Health in 1921.

The year 1921 started auspiciously. The rainfall in January was in excess (133 per cent.) of the average and the rivers, springs, and wells gave every promise of fulfilling their usual functions. From this point onwards throughout the whole year (except September) the rain failed lamentably to come up to average expectations, every month (except November) had a temperature above the average, and the sunshine records were most remarkable. The consequence was that the shortage of water became apparent early in the summer and has been acute ever since. Even at the present moment there are many places where water is being sold at so much a gallon and is being conveyed by road or rail considerable distances to supply the needs of man and to save the lives of the lower animals. Apart from agricultural difficulties, most of us who acted like good citizens found our lawns and shrubs and flowers almost ruined by the drought, and it is small consolation to remember that there probably has never been a year when yuccas flowered so abundantly all over the country.

It is satisfactory, however, to record that the year 1921 has been, on the whole, remarkably healthy, both as judged by the relative absence of sickness and the low death-rate. It used to be held that an abnormally hot year meant that the infantile death-rate would go up by leaps and bounds, but the reverse is true of 1921. This apparent lightening of the load of sickness and death is the more remarkable, as the year was one of acute depression in trade, with much unemployment and the psychology of the nation was tried to the utmost by the cumulative effect of past and present happenings. For the first two years after the war most people had, or behaved as if they had, enough money to drown their sorrows in conviviality and the pursuit of pleasure. Last year proved very depressing to most individuals, the cumulative effect of heavy taxation, the high cost of living, vanishing of savings, heavy depreciation of securities, restricted credits, bad trade and uncertainty as regards the future combined to throw a gloom over 1921, which made many of us wonder if the aftermath of war was not almost as hard to bear as the fateful years of 1914–18.

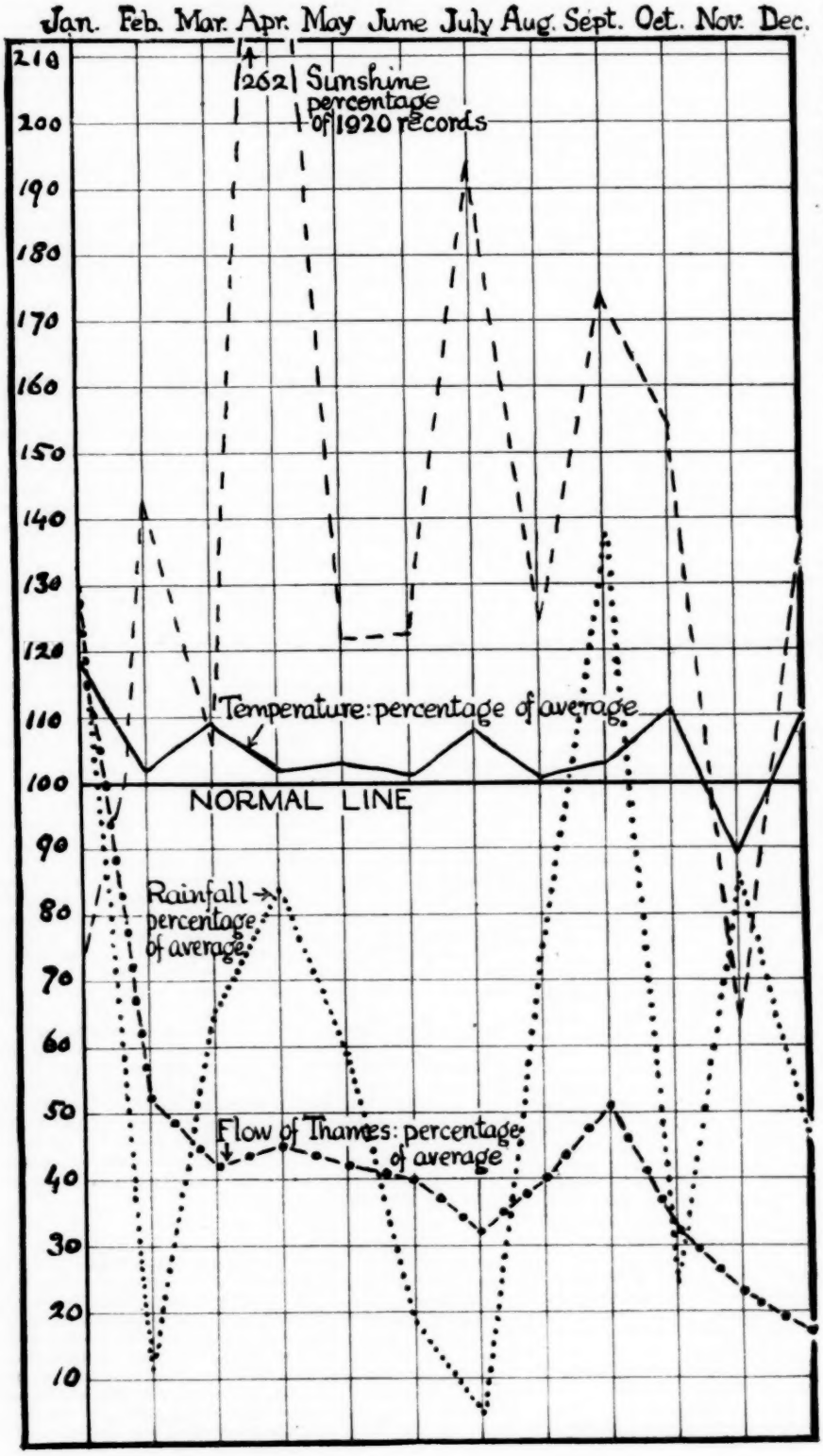
Yet, despite all these things and the discomforts and hardships produced by the prolonged drought, the pulse of the nation remained good. We are led, however, to wonder a little if the same is true as regards our mental equipment. Registered illnesses and deaths, and even the recorded experiences of individual medical men, do not necessarily convey the whole story of the well-being of a community. Our nerves have jangled to sad tunes of recent years and it is impossible to shut one's eyes to the frequent cases of nervous breakdown. If the processes which lead to mental instability could be recorded on the baragraph, we fear that the graph

TABLE SHOWING TEMPERATURE, RAINFALL, SUNSHINE, AND FLOW OF RIVER THAMES DURING EACH MONTH OF THE YEAR 1921 (CAMDEN SQUARE AND THAMES CONSERVANCY RECORDS).

Month.	Mean temperature degrees F.			Rainfall in inches.			Duration of sunshine in hours.			Average daily natural flow of R. Thames in millions of gallons at Teddington Weir.		
	1921.	Average 1881–1915.	Per cent. of average.	1921.	Average 1881–1915.	Per cent. of average.	1921.	1920.	Per cent. of 1920.	1921.	Preceding 38 years.	Per cent. of average.
January ..	46·0	38·8	118·6	2·48	1·86	133	20·0	27·0	74·1	3159·7	2474·8	127·7
February ..	40·7	40·0	101·7	0·18	1·67	11	46·8	32·7	143·1	1253·7	2408·9	52·0
March	46·8	42·9	109·1	1·19	1·83	65	113·8	107·3	106·1	885·4	2112·6	41·9
April	49·5	48·4	102·3	1·29	1·54	84	191·7	73·1	262·2	688·1	1515·9	45·4
May	57·0	55·1	103·4	1·03	1·76	59	227·6	186·8	121·2	481·9	1135·7	42·4
June	61·8	61·0	101·3	0·37	2·02	18	221·7	180·2	123·0	328·3	831·7	39·5
July	69·4	64·3	107·9	0·13	2·38	5	253·9	130·7	194·3	205·1	635·9	32·3
August ..	63·7	63·2	100·8	1·65	2·21	75	157·3	125·7	125·1	228·1	567·7	40·2
September ..	60·5	58·6	103·2	2·50	1·82	137	134·6	77·4	173·9	279·9	548·0	51·1
October ..	56·2	50·7	110·8	0·63	2·63	24	130·4	84·9	153·6	288·9	902·5	32·0
November ..	39·4	44·3	88·9	2·01	2·36	85	27·1	42·2	64·2	337·7	1463·6	23·1
December ..	44·4	40·5	109·6	1·13	2·39	47	25·0	18·3	136·6	352·0*	2073·1	17·0
Total rainfall				14·59	24·47	60						

* Approximate.

GRAPH SHOWING THE MONTHLY RETURNS FOR 1921 OF TEMPERATURE, RAINFALL, SUNSHINE, AND FLOW OF RIVER THAMES.



would show a sorry picture of the direction in which many lives are now drifting.

It may seem a curious thing to embody these reflections in an article dealing chiefly with the drought in relation to water-supply. Nevertheless, we feel that prosperity is the key to both the health and happiness of the nation, and there are considerations which have arisen, or are arising, out of the drought which throw considerable light on the problems of our economic welfare.

Some Practical Deductions.

In the first place it is abundantly clear that without detriment to health, or infringing the laws of decency, we can reduce the consumption of water very materially. This fact will doubtless be borne in mind when new Water Bills appear before Parliament.

Secondly, the time is ripe for challenging the necessity for providing one-third of the supply as compensation water, irrespective of the real needs of the situation and because that proportion is governed by precedent.

Thirdly, fresh capital expenditure should not be incurred without taking stock of what has been going on within recent years. It is within our knowledge that millions of pounds have been saved by the application of science to the water problems of the day without any loss of security, and we see infinite scope for advance in this direction.

Fourthly, the public are being roused to take an interest in meteorology and water questions in a way never experienced before, and this may lead to

useful economies being effected without in any way imperilling the safety of our water-supplies.

Fifthly, the detection and prevention of waste has received so useful a fillip and has proved so effective in practice that a reversion to the old careless order of things should not be countenanced. In this connexion we would warn the public that the days of frost are at hand and that the reckless running of taps with the idea of preventing pipes being frozen is not permissible legally, or justifiable morally.

Lastly, we think that the serious inequalities in the domestic rate of consumption of water throughout the country merits the attention of the Ministry of Health and Parliament. Surely some standard, or standards, could be fixed sufficiently elastic to meet the requirements of different places without interfering with the laws of decency and good health. This would be the surest way of maintaining waste detection at the highest point of efficiency, of encouraging personal economy in the use of water, and of saving the ratepayers unnecessary expenditure.

The Citizen's Duty.

Passing now to the problems which confront us all in 1922 and perhaps later, it would be well if every citizen, quite independently of what the skies may send us in the shape of rain, snow, or hail, considered that a state of drought continued to prevail until authoritative statements to the contrary are forthcoming. In the case of many supplies, chief anxiety may be felt as late as next autumn, and it would be a grave mistake to imagine that torrents of rain in the near future are necessarily going to tide us comfortably over future contingencies.

The main thing is for each individual to continue to economise in the use of water by the methods which experience has already taught us, and, if possible, to devise new plans for conserving a commodity, the value of which has only been brought home to us by the bitter lesson of adversity. It needs to be remembered that in most cases no amount of expenditure could possibly be in time to retrieve the situation created in 1921 if it persisted in 1922 even to a moderate extent. Waterworks authorities may be trusted to do their utmost to conserve water and to ensure its purity, but it is the bounden duty of each consumer to exercise the strictest economy lest worst things befall.

Communal and State Action.

In respect to communities, we could cite many instances where water authorities influenced by questions of drought, temporary expediency, or economical considerations have cut the Gordian knot by calling in all the resources of science to their aid with results alike favourable to water consumers and the progress of knowledge. It is perhaps unnecessary in this connexion to utter a word of caution, because public water authorities are now so keenly alive to questions of safety that they would not dream of countenancing new departures which did not bear the hall-mark of scientific approval.

As regards the State it is a moot question whether the Ministry of Health should not be prepared for every eventuality and consider the feasibility of providing mobile sterilisation plants, available at a moment's notice and capable of being rushed to the rescue of any water-supply in distress. Quite apart from the present situation the provision of a live force ready to combat and deal with sudden emergencies is not inconsistent with the policy of a Ministry, which already has shown its desire to subordinate criticism to active help.

Waterworks authorities have already been asked by the Ministry for certain particulars as regards *quantity* of water, and no doubt in time a comprehensive report will be issued on the subject, which should prove to be of great value. We hope that the Ministry has, or will consider, the question of *quality* as well. It has been, and still is, a golden opportunity for the collation of all facts bearing on the *quality* of our supplies throughout the country, and only the Ministry of Health can call for official returns of this kind. Moreover, the department is well qualified to deal with the subject scientifically and from the epidemiological point of view.

So far as our necessarily limited information is concerned we hear, on the whole, favourable news as regards the quality of water supplied during 1921 to consumers, but the future needs careful watching, and the transition from a period of unparalleled drought to normal conditions may not be wholly free from dangerous elements.

Public Health Services.

WILLESDEN MUNICIPAL HEALTH SERVICE: INTERCHANGE OF VIEW BETWEEN DISTRICT COUNCIL AND LOCAL PRACTITIONERS.

THE resolutions[1] passed by the Willesden Division of the British Medical Association on Nov. 15th, 1921, gave rise to a detailed reply, dated Dec. 21st, from the clerk to the Willesden Urban District Council, and this in turn to a reasoned rejoinder from the Willesden Division passed at a special meeting on Jan. 17th. As these two documents are of more than local interest, dealing, as they do, with problems of public health administration likely to arise elsewhere, we give them at substantial length, alluding, for the sake of brevity, to the disputants as Council and Association respectively where no ambiguity can arise.

THE COUNCIL'S VIEW.

The Council, as the local sanitary authority and local education authority, has certain duties and powers placed upon it under Acts of Parliament, its health policy being determined in accordance with the provisions of these Acts and the consents or directions of the Government departments concerned. The Council cannot accept the view that its function is to deal with the health of the necessitous poor only; it has to safeguard the health and act in the interests of the entire community.

Municipal Clinics.

Municipal clinics developed as the result of the medical inspection of school children, amongst whom many defective conditions requiring treatment were reported year by year. These children had, in the majority of cases, not received medical attention, and it was to secure it for conditions hitherto not medically treated that school clinics were established in Willesden and elsewhere. The same might be said of M. and C.W. clinics; the majority of cases which attend would not go to a private practitioner for advice until their health was undermined. The Council considers that advice in health and early treatment following upon the first manifestations of disease are factors of prime importance in preventive medicine, and that municipal clinics, in providing these facilities for mothers and pre-school children, are carrying out health work of national importance not provided for by any other agency. The clinics, too, provide specialist treatment and, in addition, have a staff of visiting consultants, whose services otherwise would not be generally available for the persons attending.

Efficiency and Results.

In all the services carried out on behalf of the ratepayers the Council limits expenditure to the utmost extent consistent with efficiency, and is therefore anxious to receive information from the Association by which expenditure might be curtailed and the health services provided through other agencies. The Council would be glad to learn precisely in what respects its policy is opposed to the interests of the general community. The statement that the Council's present arrangements tend to

[1] THE LANCET, 1921, ii., 1125.

neglect the preventive aspect of health work for the curative is not borne out by the vital statistics for 1920. In that year the general death-rate was 9·78, and the infant mortality-rate was 65, both figures being the lowest recorded.

Municipal Hospital.

The Association criticises the Willesden Municipal Hospital on the basis of reports to the Council by its M.O.H. and medical superintendent. The Council is fully aware that the hospital is not equipped to the best possible extent to meet all public demands, but in the present financial circumstances believes that the best possible use is being made of the hospital accommodation at its disposal. The Association appears to consider that the removal of infectious diseases to hospital will stop the spread of epidemics; this statement is not in accord with the history of scarlet fever and diphtheria since isolation hospitals were established. The inability of the Council to remove to hospital at once all cases of infectious diseases applies equally to other districts. To build a hospital so large that all cases of infectious diseases occurring during epidemic periods could be taken in is not a practical proposition. It would mean in Willesden the addition of at least 200 beds to the municipal hospital. With reference to the statement that 1113 infectious cases were admitted to the hospital during 1920 and 1495 non-infectious cases, it is to be observed that infectious cases are detained much longer than non-infectious. Regarding the criticism as to the admission of maternity cases to a hospital where infectious cases are also admitted, pavilion B, separate from all other pavilions of the hospital, was altered in 1917–18 for the reception of maternity cases. From June, 1918, when the alterations were completed, up to Dec. 8th, 1921, 1089 women have been confined in the hospital without a case of any of the common infectious diseases having been contracted in this pavilion. The statement that the admission of maternity cases to a hospital can only be justified on account of abnormal physical condition is not one to which the Council can subscribe. The health authority is bound to have regard to environmental hygiene and the conditions under which confinement is to take place at home. Out of 413 confinement cases admitted between Jan. 1st and Dec. 12th, 1920, 55 had been sent in on account of the physical condition of the patient, 69 on account of both physical and home conditions, 179 on account of home conditions (in 80 of these cases the family lived in only one room), 7 because they were unable to obtain the necessary nursing or domestic help, 27 on account of illegitimacy, 19 because they preferred hospital care, 39 as urgency cases, and in the remaining 18 cases the reasons for admission were not recorded. The Council does not limit admission to hospital to certain districts of Willesden.

The staff at the clinics who were overburdened before the introduction on Oct. 1st, 1921, of the scale of charges have now sufficient time in which to deal with both the preventive and curative aspects of their work, and in addition have some time to spare to devote to the routine medical inspection of one age-group of public elementary school children (B. of E. letter, Oct. 27th, 1921).

Coöperation with Practitioners.

The Council notes the objection taken to the statement that the municipal hospital and clinics have been established much on the lines indicated in the Dawson Report, because whole-time medical officers only are employed in the public health services, and because the private practitioner has no access to the hospital and clinics. The Council would remind the Association that all doctors practising in Willesden were notified on Nov. 1st, 1918, of the arrangements made at the municipal hospital for maternity cases and cases of diseases of children, and that in the circular referred to it was stated that the Council's obstetrician and gynæcologist would attend the hospital on Tuesday mornings at 9.30 A.M., and would be glad to see any practitioner concerning any case he might send. A similar circular in January, 1920, notifying doctors practising in Willesden of the extended arrangements for consultations at the municipal hospital and clinics, stated the times at which the specialists attended, and that they would be glad to see any mother, or child up to the age of 14 years, referred by a medical practitioner either personally or by letter. From April 1st to Dec. 8th, 1921, out of 445 women and children admitted to the municipal hospital, 81 were sent in by private practitioners, and in only one or two of these cases had the doctors availed themselves of the facilities offered for consultation.

The Council is prepared to consider any scheme which the Association may care to put before it for working in the municipal hospital and clinics, reserving the right to come to the final conclusion after consideration from every point of view, including that of the doctors in particular, the community in general, administration and finance.

THE ASSOCIATION'S VIEW.

The Council has failed to appreciate in several respects the meaning of the Association's memorandum, reference to which will indicate the Association's realisation of the Council's responsibility in respect of public health; and the absence of any suggestion, either that such responsibility should "cease with the care of the health of the necessitous poor," or that the health work of the Council was not a matter of great national importance, or that the Council should provide and keep empty a bed for every possible case of infectious disease during an epidemic such as that now prevalent. It was rather in recognition of the Council's important position as public health authority for the district and in the belief that the welfare of the community and the policy of the Ministry of Health alike demand the active coöperation of all agencies in the promotion of the public health, that the Association approached the Council in the first instance with a criticism of the existing health policy.

The Association welcomes the suggestion to submit a scheme for working in the Council's hospitals and clinics, but would point out that an indispensable preliminary to such coöperation is the creation of an Advisory Medical Council on the lines indicated in the Dawson Report, and that the essential condition of such coöperation will be modification of the existing system in accordance with the principles already laid down. The points at which, in its opinion, the Council's present policy is not conducive to the public welfare have already been indicated.

Suggestions for Economy.

As regards economy, it is hoped that the following suggestions may be of use to the Council:—

1. By the adoption of the Dunfermline scheme a large amount of treatment of school children could be carried out by local practitioners at their surgeries or in the children's homes. The system makes adequate provision for ensuring that no child shall go without treatment. The school medical staff would thus be freed to concentrate on preventive work, and more especially on the routine inspection ordered by the Board of Education, and on the important work of cleansing. This would ensure the earliest possible detection (and consequently treatment) of all defective conditions and must decrease preventable disease.

2. The system of records, indicated in the Forty-fifth Annual Health Report, seems unduly complicated. These records are not complete since they cannot deal with illnesses treated in the home. A brief note by the doctor should, in most cases, be sufficient for practical purposes.

3. Expenditure on the free distribution of dried milk and virol during 1919 appears to have been excessive.

4. The Association is of opinion that conditions in Willesden do not justify the expenditure of £6 per birth, as against £2 per birth in other districts with a similar population.

5. Something might be done to encourage voluntary work as approved by the Ministry.

Alleged Government Approval.

The Council appears to claim for its policy the approval of the Government departments concerned.

During the war it was necessary to sanction many irregularities and local authorities have much freedom in the application of principles laid down centrally, but the Willesden health policy is in direct opposition in many important respects to that outlined in the official literature of the Ministry of Health and of the Board of Education. Thus the chief medical officer of the Board of Education writes:—

"The inspected child who requires treatment should always be referred to the private practitioner when he is willing or able to undertake the necessary treatment . . . and when the parents can pay the cost of the treatment. The establishment of school clinics does not abolish this principle."

"An overcrowded clinic is an inefficient one, and a clinic devoted exclusively to crowds of children may lose its preventive and educative functions."

And in connexion with secondary schools the records "emphasise the urgency for the school medical service to become increasingly preventive rather than curative."

Arguments from Mortality Rates.

The Council argues from the general and infant mortality rates for 1920 that preventive work in the district is efficiently carried out. The Association congratulates the Council upon the figures quoted, but desires to point out the danger of founding any argument upon an isolated figure. Even after careful examination over a long period the mortality rate is not the only index to be considered in connexion with the efficacy of preventive work. The Association would remind the Council that the full infant mortality figures for the last three years are as follows:—

	Clinic babies.	Non-clinic babies.	All babies.
1918	46·1	161·6	97
1919	38·5	110·1	82 8
1920	43	75	65

Thus the reduction in the infant mortality rate for 1920 has occurred entirely amongst babies not attending the clinics, while there has been an actual increase in the rate amongst the clinic babies. The Association does not suggest that the increased mortality in 1920 is caused by the activities of the clinics. Statistics are double-edged weapons. The apparently higher mortality among non-clinic babies is due to the inclusion of babies under four weeks which obviously do not attend the clinics. If these are excluded the non-clinic baby death-rate is much lower than the clinic baby death-rate.

Use of the Municipal Hospital.

The Association welcomes the statement that the proposal to limit admission to the hospital to certain districts of Willesden has not been carried out, and is glad to learn that the utilisation of one block of the hospital for maternity cases has not so far led to any fatalities. It is not, however, satisfied that the hospital is being used to the best advantage or that there is sufficient justification for the exclusion of urgent infectious cases in order to accommodate non-infectious cases and normal maternity cases. For such cases the London hospitals, the Willesden General (voluntary) Hospital, and the Park Royal Hospital are available and could be utilised by private practitioners when necessary. The utilisation of the fever hospital for non-infectious cases causes an undue and unnecessary strain on the staff at all times and precludes the proper use of the hospital for urgent fever cases. The arguments for accepting normal maternity cases from homes unsuitable for confinements can be applied with an even greater force to the removal from the same homes of fever cases.

Whilst it is not suggested that the provision of a sufficient number of beds will "check an epidemic," it is contended that the immediate removal of an infected patient will often prevent the spread of the disease within a given family. The figures quoted by the Council do not affect the general argument, and the figures with regard to confinements at the hospital are particularly disquieting, indicating as they do a total lack of inquiry as to the justification for reception at an overcrowded hospital in an appreciable percentage of cases.

Limitation of Benefits at Clinics.

The Association is astonished to learn of the position in respect of the Council's clinics. What class of patient has ceased to attend the clinics? If the more necessitous mothers are unable to afford the registration fee of 2*s.* 6*d.*, their exclusion from the benefits of the clinic appears particularly unfortunate. If, on the other hand, the more well-to-do mothers do not consider the treatment obtained at the clinic worth the amount charged, such a result hardly appears to support the Council's contention. As regards the general question of limiting free treatment at the Council's clinics to necessitous cases, the Association desires to emphasise the fact that even with a whole-time staff of 5 medical officers, 12 clerks, and 32 nurses, it is hardly possible to offer all necessary medical treatment to the whole of the mothers and children of Willesden. Some limitation being necessary, limitation to necessitous cases would appear to be reasonable, the more so as cases that are not necessitous can obtain treatment through other agencies.

The Functions of a District Council.

The Association would like to make it clear that it has not entered into the controversy merely for the sake of controversy, and that its members claim to be as much concerned about the health of the Willesden community as the Council is. As doctors, they believe they have the knowledge and experience which justifies them in criticising the methods of the Health Committee. As ratepayers they think they are justified in taking exception to expenditure which, in their opinion, could be avoided without injury to the community—in fact, with benefit to it.

The Association believes that the duty of the Council to safeguard the health of the community would be better carried out if it confined itself to strict and earnest attention to preventive medicine. It has a staff specially trained for that purpose and the practitioners in the area are willing and able to look after the curative side, both as private practitioners for people who can pay for themselves, or in coöperation with the Council for people unable to provide medical treatment without help from the community.

A Medical Advisory Council.

The first step to cordial coöperation between the Council and the doctors in an effort to improve the health of the Willesden public is the establishment of a Medical Advisory Council elected by the medical profession of Willesden. It would be the duty of that body to place its opinions on medical matters before the elected representatives of the ratepayers, and it would be the duty of the Council to consult the committee on all such matters. The final responsibility for action would, of course, rest with the Council.

VITAL STATISTICS OF LONDON

DURING DECEMBER, 1921.

IN the accompanying table will be found summarised statistics relating to sickness and mortality in the City of London and in each of the metropolitan boroughs. The enumerated population (unrevised) of the last census has been used for calculating the rates in the table, with a deduction of the non-civilian population in the City of Westminster and in the borough of Woolwich. With regard to the notified cases of infectious disease, it appears that the number of persons reported to be suffering from one or other of the ten diseases notified in the table was equal to an annual rate of 13·0 per 1000 of the population, enumerated at 4,476,238 persons; in the three preceding months the rates had been 11·1, 19·5, and 17·0 per 1000. Among the metropolitan boroughs the lowest rates from these diseases were recorded in Kensington, Chelsea, the City of Westminster, St. Marylebone, Holborn, and the City of London; and the highest in Hammersmith, Hampstead, St. Pancras, Bermondsey, Battersea, Greenwich, and Woolwich. The prevalence of enteric fever was about one-third less than in the preceding month; of the 20 cases notified during the four weeks ended Dec. 31st, 3 cases belonged to the City of

ANALYSIS OF SICKNESS AND MORTALITY STATISTICS IN LONDON DURING DECEMBER, 1921.

(Specially compiled for THE LANCET.)

CITIES AND BOROUGHS.	Enumerated population, 1921 (unrevised).	Notified Cases of Infectious Disease.												Deaths from Principal Infectious Diseases.									Deaths from all causes.	Death-rate per 1000 living.
		Enteric fever.	Other continued fevers.	Small-pox.	Scarlet fever.	Diphtheria.*	Erysipelas.	Poliomyelitis and polioencephalitis.	Encephalitis lethargica.	Cerebro-spinal fever.	Puerperal fever.	Total.	Annual rate per 1000 persons living.	Enteric fever.	Small-pox.	Measles.	Scarlet fever.	Whooping-cough.	Diphtheria.*	Diarrhœa and enteritis (under 2 years).	Total.	Annual rate per 1000 persons living.		
LONDON	4,476 238	20	—	1	2583	1583	219	4	7	6	26	4449	13·0	5	—	55	34	92	139	54	379	1·1	5663	16·5
West:																								
Paddington ...	144,273	—	—	—	51	32	10	1	—	—	2	96	8·7	—	—	—	—	—	—	2	2	0·2	176	15·9
Kensington... ...	175,686	—	—	—	58	36	13	—	1	1	1	110	8·2	—	—	—	2	1	1	6	10	0·7	270	20·1
Hammersmith...	130,287	—	—	—	120	45	7	—	—	—	1	173	17·3	—	—	—	—	5	4	4	13	1·3	174	17·4
Fulham	157,944	—	—	—	79	50	8	—	—	—	2	139	11·5	—	—	1	1	11	5	2	20	1·7	191	15·8
Chelsea	65,700	—	—	—	17	4	—	—	—	1	—	22	4·5	—	—	—	—	—	1	—	1	0·2	83	17·0
City of Westmin'r	138,402	3	—	—	48	18	5	—	—	—	—	74	7·0	—	—	—	1	—	2	2	5	0·5	162	15·3
North:																								
St. Marylebone...	104,222	—	—	—	35	23	7	1	—	1	—	67	8·4	—	—	—	—	—	5	2	7	0·9	154	19·3
Hampstead ...	86,080	—	—	—	51	51	5	—	1	—	—	108	16·4	—	—	1	2	—	6	1	10	1·5	114	17·3
St. Pancras... ...	210,986	2	—	—	204	57	5	—	—	—	1	269	16·6	1	—	7	1	5	7	2	23	1·4	314	19·4
Islington	330,028	1	—	—	205	132	14	1	—	—	3	356	14·1	—	—	7	5	2	8	1	23	0·9	436	17·2
Stoke Newington	52,167	—	—	—	37	6	1	—	—	—	1	45	11·2	—	—	—	—	—	1	—	1	0·2	61	15·2
Hackney	222,159	2	—	—	129	63	6	—	—	—	2	202	11·9	—	—	1	1	4	8	1	15	0·9	218	12·8
Central:																								
Holborn	42,796	2	—	—	14	9	2	—	—	—	—	27	8·2	—	—	—	—	1	—	—	1	0·3	53	16·1
Finsbury	76,019	—	—	—	23	10	18	—	—	—	—	51	8·7	—	—	—	1	3	1	3	8	1·4	100	17·1
City of London...	13,706	—	—	—	2	2	—	—	—	—	—	4	3·8	—	—	—	—	—	—	—	—	—	19	18·1
East:																								
Shoreditch... ...	104,308	—	—	—	42	54	4	—	—	—	1	101	12·6	—	—	—	—	1	5	1	7	0·9	139	17·4
Bethnal Green...	117,238	1	—	—	40	61	6	—	—	—	—	108	12·0	1	—	11	—	7	4	3	26	2·9	159	17·7
Stepney	249,738	1	—	—	69	114	15	—	1	1	—	201	10·5	1	—	7	2	9	18	3	40	2·1	320	16·7
Poplar	162,618	1	—	—	105	77	12	—	—	—	1	196	15·7	—	—	9	2	8	10	2	31	2·5	199	16·0
South:																								
Southwark... ...	184,388	2	—	—	75	50	10	—	1	—	2	140	9·9	—	—	—	1	9	8	4	22	1·6	278	19·7
Bermondsey ...	119,455	—	—	—	46	116	3	—	—	—	1	166	18·1	—	—	—	3	3	16	1	23	2·5	162	17·7
Lambeth	302,960	1	—	—	211	64	14	—	—	—	2	292	12·6	—	—	6	—	13	5	5	29	1·2	396	17·0
Battersea	167,693	2	—	—	128	104	9	—	1	—	—	244	19·0	—	—	—	—	2	6	2	10	0·8	209	16·2
Wandsworth ...	328,656	—	—	1	210	91	6	—	1	—	—	309	12·3	1	—	2	3	—	4	2	12	0·5	346	13·7
Camberwell ...	267,235	1	—	—	194	76	6	—	—	2	1	280	13·7	—	—	—	5	4	8	3	20	1·0	334	16·3
Deptford	112,500	1	—	—	73	36	9	1	—	—	—	120	13·9	1	—	—	2	1	—	—	4	0·5	129	14·9
Greenwich... ...	100,493	—	—	—	67	87	9	—	—	—	3	166	21·5	—	—	2	—	1	2	1	6	0·8	122	15·8
Lewisham	174,194	—	—	—	141	57	5	—	1	—	2	206	15·4	—	—	—	—	1	1	—	2	0·1	181	13·5
Woolwich	136,307	—	—	—	109	58	10	—	—	—	—	177	16·9	—	—	1	2	1	3	1	8	0·8	164	15·7

* Including membranous croup.

Westminster, and 2 each to St. Pancras, Hackney, Holborn, Southwark, and Battersea. There were 18 cases of enteric fever under treatment in the Metropolitan Asylums Hospitals at the end of the month, against 37, 28, and 20 at the end of the three preceding months; the weekly admissions averaged 3, against 7, 4, and 4 in the three preceding months. One case of small-pox, from the borough of Wandsworth, was notified during the month. The prevalence of scarlet fever showed a marked decline—about 30 per cent.—from the preceding month; this disease was proportionally most prevalent in Hammersmith, St. Pancras, Battersea, Lewisham, and Woolwich. The Metropolitan Asylums Hospitals contained 5248 scarlet fever patients at the end of the month, against 4847, 6154, and 5879 at the end of the three preceding months; the weekly admissions averaged 622, against 840, 1000, and 802 in the three preceding months. Diphtheria showed a fall in prevalence of about 10 per cent. from that of November; the greatest proportional prevalence of this disease occurred in Hampstead, Shoreditch, Bethnal Green, Stepney, Poplar, Bermondsey, Battersea, and Greenwich. The number of diphtheria patients under treatment in the Metropolitan Asylums Hospitals, which had been 2031, 2777, and 3055 at the end of the three preceding months, further rose to 3163 at the end of December; the weekly admissions averaged 389, against 322, 445, and 416 in the three preceding months. Erysipelas was proportionally most prevalent in Kensington, Finsbury, Poplar, Deptford, Greenwich, and Woolwich. The four cases of poliomyelitis or polioencephalitis belonged respectively to Paddington, St. Marylebone, Islington, and Deptford. Seven cases of encephalitis lethargica were notified during December, against 5, 3, and 12 in the three preceding months. The notified cases of cerebro-spinal fever numbered 6, against 5, 3, and 6 in the three preceding months; of these, 2 belonged to Camberwell. The 26 cases of puerperal fever included 3 in Islington and 3 in Greenwich.

The mortality statistics in the table relate to the deaths of civilians actually belonging to the several boroughs, the deaths occurring in institutions having been distributed among the boroughs in which the deceased persons had previously resided. During the four weeks ended Dec. 31st, the deaths of 5663 London residents were registered, equal to an annual rate of 16·5 per 1000; in the three preceding months the rates had been 11·0, 11·4, and 15·0 per 1000. The death-rates ranged from 12·8 in Hackney, 13·5 in Lewisham, 13·7 in Wandsworth, 14·9 in Deptford, 15·2 in Stoke Newington, and 15·3 in the City of Westminster, to 18·1 in the City of London, 19·3 in St. Marylebone, 19·4 in St. Pancras, 19·7 in Southwark, and 20·1 in Kensington. The 5663 deaths from all causes included 379 which were referred to the principal infectious diseases; of these 5 resulted from enteric fever, 55 from measles, 34 from scarlet fever, 92 from whooping-cough, 139 from diphtheria, and 54 from diarrhœa and enteritis among children under 2 years of age. No death from any of these diseases was recorded in the City of London. Among the metropolitan boroughs the lowest death-rates from these diseases were recorded in Paddington, Chelsea, Stoke Newington, Holborn, and Lewisham; and the highest in Bethnal Green, Stepney, Poplar, and Bermondsey. The 5 fatal cases of enteric fever agreed with the average in the corresponding period of the five preceding years. The 55 deaths from measles were 8 fewer than the average; of these, 11 belonged to Bethnal Green, 9 to Poplar, 7 each to St. Pancras, Islington, and Stepney, and 6 to Lambeth. The 34 fatal cases of scarlet fever were 20 in excess of the average; of these, 5 belonged to Islington, 5 to Camberwell, 3 to Bermondsey, and 3 to Wandsworth. The 92 deaths from whooping-cough were 55 above the average; the greatest proportional fatality from this disease occurred in Hammersmith, Fulham, Finsbury, Bethnal Green, Poplar, Southwark, and Lambeth. The 139 fatal cases of diphtheria exceeded the average by 65; this disease was proportionally most fatal in St. Marylebone, Hampstead, Shoreditch, Stepney, Poplar, Southwark, and Bermondsey. The 54 deaths from infantile diarrhœa showed a decline of 20 from the average; of these, 6 belonged to Kensington, 5 to Lambeth, 4 to Hammersmith, and 4 to Southwark. The aggregate mortality in London during December from these principal infectious diseases was 42 per cent. above the average.

The deaths from influenza registered in London during the four weeks ended Dec. 31st numbered 262, against 21, 40, and 91 in the three preceding months; of these, 151 were recorded in the last week of the year. In the corresponding periods of the five preceding years the numbers had been 320, 40, 1263, 63, and 68.

Correspondence.

"Audi alteram partem."

THE ERECT POSTURE.

To the Editor of THE LANCET.

SIR,—Dr. J. Knox Thompson has done good service in drawing attention (THE LANCET, Jan. 14th, p. 107) to the disadvantages under which man labours in consequence of his erect posture. It is interesting to find that charwomen seem actually to enjoy the all-four position adopted in scrubbing the floor, and I am told that young girls in cookery schools delight in the same occupation; they sometimes actually spill water as an excuse to going on all-fours to wipe it up!

In considering the influence of the upright position on the circulation, it is necessary to distinguish clearly between standing, walking, and running. Standing is less favourable to the circulation than the latter two, inasmuch as rhythmical muscular contractions are an important aid to the circulation; and in this connexion it is worthy of note that under natural conditions man spends little of his time in standing still: he either moves about or lies down. Such considerations emphasise the fact, universally admitted, that it is bad for humans—whether school-children, shop-assistants, cooks, or what not—to remain standing for any length of time; and they further point to the advantage of reclining after the oriental fashion over sitting down. Many women derive great benefit from lying down an hour or so during the day.

Valuable as are Dr. Thompson's observations, his inferences do not appear to me always sound when dealing with mechanical problems. In assuming, e.g., that in the upright posture the whole weight of the lungs is supported by the diaphragm, and that the two upper pairs of ribs press upon them "like a collar," is he not overlooking the fact that the lungs, far from exerting pressure upon the thoracic walls, actually exercise suction upon them? Again, in concluding that the pumping of blood from the heart to the top of the head in the erect posture—a distance of some two feet as against half a foot in the quadruped—adds a 20 per cent. increase to the blood pressure, is he taking into account the syphon action of the veins, and the compensatory action of the arterioles? It is on the degree of contraction of these vessels that the resistance which the heart has to overcome mainly depends.

I am, Sir, yours faithfully,

HARRY CAMPBELL.

Wimpole-street, W., Jan. 14th, 1922.

CLINICAL LABORATORY SERVICE.

To the Editor of THE LANCET.

SIR,—A sentence in your leading article of Jan. 7th on Clinical Laboratory Service raises shortly the important question as to how far the pathological staff of an undergraduate medical school may properly deal with the diagnosis of material originating outside their associated hospital. As you suggest, it is very natural that the clinical staff should prefer to have in their general work the assistance of laboratory workers whom they have learned by hospital experience to trust. In other cases, notably the venereal diseases scheme which operates in London, there are considerations of uniformity and combination for the common good which, at any rate to some degree, commend the importation of outside diagnostic work. But to dwell on these instances where the practice is pretty free from any very substantial objection is to obscure and perhaps forget the general principle under which they have to be considered.

As I believe, this principle is that no university department ought to earn money by exploiting the technical skill of its staff. Why exactly this is so I do not know or, at any rate, cannot state quite clearly, but I imagine it follows from the ideals which govern the life of teaching and the promotion of knowledge being incompatible with those that dominate a professional life of practical service and utility. There is no question about the one set of ideals being better or worse than the other; the nature of the work has nothing to do with this, only the way in which it is done. But the two are different and mostly apparently immiscible. Diagnosis done on academic ideals, or teaching and research conducted on professional ideals mean work wrongly and often, I think, carelessly done, and this is not right. However, whatever the reason may be, my experience is that diagnosis for fees is not done in the pathological laboratories of universities without deterioration of standard and outlook. It is an easy way of earning a good deal of money but it is one of the devil's temptations; and like his other devices is to be dealt with only by being clear on the germane general rule.

To laboratories other than those where business is the promotion of learning I do not think the same general rule applies. Roughly speaking, I should say that university schools seek to do something for the souls of their students (among whom I include the teachers) as well as to teach them a professional technique; medicine has, I suspect, kept this in view more clearly than some other branches of study related to professional life. Schools dealing frankly with professional technique for graduates are in rather a different category; they are dealing much more with the world as it is rather than the world as it might be, and diagnosis for fees is a necessary part of a universe in which fees of any sort survive.

It would be pedantic to suggest that the general rule that I have indicated must necessarily prevent practitioners getting an opinion in which they will have confidence from the pathological staff of the school at which they were trained. Any rule against this would plainly cut straight across the amiable coöperation among present and past students which is so admirable a corporate feature in our schools. But the reason for doing it must be friendliness and helpfulness, not the fact that money is thereby earned for the laboratory. Indeed the fees would best be minimised in every way. And remembering that importunity is apt to strain even tolerably well-established friendships, it would be wise that simple routine should go elsewhere where it can be dealt with equally well and that the resources of alma mater should be invoked only where special difficulty or importance requires special care.

Which brings me to what I really want to say, which is that I hope that the arrangement which you report at St. Bartholomew's will encourage no one to embark on the wider extensions which have proved so disastrous to the progress of pathology.

I am, Sir, yours faithfully,

A. E. BOYCOTT.

Medical School, University College Hospital, W.C., Jan. 15th, 1922.

CHLOROPHYLL AND VITAMIN A.

To the Editor of THE LANCET.

SIR,—Reading the annotation Chlorophyll and Hæmoglobin in THE LANCET of to-day's date, I was disappointed to find no further comment upon the question of vitamin A being possibly present in chlorophyll extracted and used therapeutically, a point raised in a note on "phyllosan" in the previous issue. I do not know by what manner of process this product is extracted, but I gather from original notes in the *Corr.-Blatt für Schw. Aerzte* that Prof. Emil Bürgi definitely claims that lipoids and vitamin A, derived from the original plants, are still unchanged in the extract now on the market. I should be very glad to learn whether it is reasonable to assume that the vitamins, as well as the chlorophyll, are concentrated by the process of extraction. It seems to me of first importance therapeutically.

I am, Sir, yours faithfully,

E. BIDDLE, M.R.C.S., L.R.C.P.

Guy's Hospital, Jan. 14th, 1922.

RESPIRATORY EXERCISES.

To the Editor of THE LANCET.

SIR,—Referring to Sir W. Arbuthnot Lane's emphasis on the importance of thoracic respiration (THE LANCET, Dec. 24th, p. 1317), it has been my custom for the last 20 years to employ respiratory exercises in all abdominal cases both before and after operation. By this means I have been able to increase very materially the vitality of the individual and to hasten recovery after operation.

If parents were educated to attend to the digestive and respiratory functions of their children we should see very few cases of adenoids, large tonsils, facial and nasopharyngeal deformity, spinal curvature, knock-knee or flat-foot, and many of the more common diseases of young life. Unfortunately the daily carrying out of such simple details of treatment as are required for the efficient performance of the intestinal and respiratory functions make a greater demand on the parents than their intelligence and selfishness and the time at their disposal, in the case of the poor, permit of.

To meet the development and effects of chronic intestinal stasis and the consequent auto-intoxication the use of paraffin before meals and the Curtis belt (as recommended by Sir Arbuthnot Lane), exercises in the prone position, breathing exercises, and the administration of suitable glandular extracts are of the greatest service. This form of hygienic treatment cannot be commenced too early in life, nor can it be carried out too thoroughly. Should any operation be called for in those who have been so treated, the risk incurred and the period of convalescence are very materially diminished.

I cannot lay too much stress upon the value I place on such exercises as tend to increase the respiratory capacity of the individual.

I am, Sir, yours faithfully,

VICTOR PAUCHET,

Paris, Jan. 14th, 1922. Surgeon to Saint-Michel Hosp., Paris.

BELLADONNA POISONING: AN ACCIDENTAL INTRAVENOUS DOSE OF ATROPINE.

To the Editor of THE LANCET.

SIR,—With reference to the cases of belladonna poisoning reported lately in your columns,[1] the following account will be interesting:—

A patient who was being treated with intravenous injections of tartar emetic for bilharzia was given intravenously by mistake 2 c.cm. of a 1 per cent. solution of atropine sulphate. The patient, who always felt sick and coughed after the tartar emetic, was agreeably surprised to feel nothing after the injection. The injection was given at midday, and immediately after the patient went to his village, which was about an hour's walk from the clinic. On the way he began to feel giddy and unable to see clearly, and had to ask a friend to take him home. On his arrival he lost conciousness and slept till the morning, when he awoke as usual. The next day he attended the clinic for the tartar emetic injection, which he was receiving on alternate days; he was then quite well and did not miss an injection. No antidote was given, as the mistake was not found out until the next day.

The atropine solution was newly made, the dose received intravenously was 0·02 g., no antidote was administered, and yet the patient was not in any way seriously affected.

I am, Sir, yours faithfully,

Cairo, Dec. 19th, 1921. W. B. HADDAD.

[1] THE LANCET, 1921, ii., 901, 1026, 1077.

THE LATE MR. C. V. BURGESS.—Mr. Christopher Venning Burgess, who became a licentiate of the Royal College of Physicians, Ireland, in 1886, and studied also at the London Hospital, died at Tadworth from pneumonia on Jan. 11th, at the age of 64.

The Services.

ROYAL ARMY MEDICAL CORPS.

Maj. and Bt. Lt.-Col. C. W. Holden to be temp. Lt.-Col. whilst empld. as Asst. Dir. of Hygiene.

Maj. A. E. Atkinson, late temp. Capt., to be temp. Maj., and to relinquish the rank of Maj.

Temp. Capts. H. S. Campion, I. Ridge-Jones, H. Cardin, and R. J. Harris relinquish their commns. and retain the rank of Capt.

ARMY DENTAL CORPS.

Lt. (temp. Capt.) H. J. Higgins to be Capt.

REGULAR ARMY RESERVE OF OFFICERS.

Col. F. R. Buswell, late R.A.M.C., having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

SPECIAL RESERVE OF OFFICERS.

Capt. D. Mackie relinquishes his commn. and is granted the rank of Maj.

TERRITORIAL ARMY.

Capts. V. G. Maitland and W. Gault (late R.A.M.C.), R. B. Smith (late R.A.M.C., Spec. Res.), and Lts. R. A. Quinn and J. A. Paterson to be Capts.

The undermentioned Offrs. relinquish their commns. and retain their rank: Capt. A. L. Yates (granted the rank of Maj.). Capts. J. S. Townley, W. Robertson, A. J. Friedlander, W. Appleyard, M. C. Anderson, and S. H. Clarke.

The undermentioned offrs., having attained the age limit, are retired and retain their rank: Lt.-Cols. W. Sinclair and J. L. Loudon. Majs. W. Doig and T. Frankish (granted the rank of Lt.-Col.), S. W. Plummer, E. T. Vint, F. R. Humphreys, D. G. Newton, D. G. Campbell, R. Brodie, and J. B. McBride. Capts. C. A. Ensor, J. Muir, W. Smartt, L. N. Reece (granted the rank of Maj.), L. H. H. Boys, G. H. Dominy (granted the rank of Maj.), M. Wilks, W. C. F. Harland, S. O. Bingham, T. D. Bell, S. R. Walker, A. E. Bullock, D. E. Evans, W. Brown, J. M. Benson, A. MacLennan, W. E. Lee, R. H. Shaw, and G. H. Rains.

TERRITORIAL ARMY RESERVE.

Maj. A. C. Farquharson, having attained the age limit, is retired and retains the rank of Maj.; and Capts. W. A. L. Jackson, W. Rogers, and R. W. Meikle, having attained the age limit, are retired.

Maj. W. L. Martin, T.D., having attained the age limit, is retired and retains the rank of Maj., with permission to wear the prescribed uniform.

Capt. W. L. Griffiths, having attained the age limit, is retired and is granted the rank of Maj.

Capt. J. McGregor, having attained the age limit, is retired and retains the rank of Capt.

Yeomanry.—Surg. Maj. G. Thomson, having attained the age limit, is retired and retains the rank of Surg. Maj.

TERRITORIAL DECORATION.

The King has conferred the Territorial Decoration upon the undermentioned Officers: Col. H. T. Samuel, A.D.M.S., Welsh Div. Lt.-Cols. C. E. Douglas, V.D. (Hon. Capt. in Army), attd. 7th Bn., Black Watch, and R. M. West, 2nd N. Mid. Fd. Amb. Majs. G. W. McIntosh, attd. 6th Bn., Ry. High., W. Dyson, attd. 7th Bn., Lanc. Fus. (ret.), and E. D. Gairdner, attd. 5th Bn., Ry. Scots Fus.

ROYAL AIR FORCE.

G. Kinneir is granted a short service commission as a Flying Officer.

Flight Lt. R. W. Ryan is granted a short service commission, retaining his present substantive rank and seniority.

Capt. J. S. Smith, Army Dental Surgeon, is granted a temporary commission as a Flight Lt. while attached for duty with the R.A.F.

INDIA AND THE INDIAN MEDICAL SERVICES.

On return from leave, Lt.-Col. A. F. W. King has resumed charge of the Civil Surgeoncy, Dharwar, with attached duties, and Lt.-Col. R. M. Carter has been gazetted Second Physician, J. J. Hospital, and Professor of Materia Medica, Grant Medical College, Bombay. Major I. D. Jones has been posted to act as Civil Surgeon, Belgaum, and Lt.-Col. C. R. Bakhle has been appointed Presidency Surgeon, Second District, and in medical charge of the Common Prison, the House of Correction, and the Byculla Schools, Bombay. Lt.-Col. J. H. McDonald has been appointed Civil Surgeon, Nasik. Capt. P. K. Gilroy has been appointed Resident Surgeon, St. George's Hospital, Bombay, and Brev. Lt.-Col. J. L. Lunham, Civil Surgeon at Sholapur. Lt.-Col. M. P. Kharegat has been granted privilege leave of absence for six

months. Lt.-Col. F. Summer has been granted five months' leave, and Maj. H. Hallilay succeeds him as Civil Surgeon, Simla. Lt.-Col. B. H. Deare has reverted to civil employment under the Bengal Government.

DEATHS IN THE SERVICES.

Col. Sir John Godfrey Rogers, K.C.M.G., D.S.O., late Director-General of the Sanitary Department in Egypt, who died on Jan. 10th, at Edenbridge, Kent, aged 71, graduated in Arts and Medicine at Trinity College, Dublin, in 1871, and immediately joined the Army Medical Service. In the Afghan War of 1878–1881 he gained the medal, and in Egypt in 1882 he was present at Kassassin and Tel-el-Kebir. He was mentioned in despatches, received the medal with clasp, and the star, and was promoted surgeon-major. He also served in the Nile Expedition of 1884–85, and with the Soudan Frontier Field Force of the following year. On both occasions he was mentioned in despatches, and for his work in the Soudan received the D.S.O. In 1883 he became P.M.O., Egyptian Army (from 1888 to 1889 he was P.M.O. with the Suakin Field Force), and later Director-General of the Sanitary Department in Egypt, and retired in 1892 with the rank of Surgeon-Lieutenant-Colonel. During the late war he acted as Commissioner of the British Red Cross in Cairo. Sir John Rogers was made a C.M.G. in 1896, and was promoted to K.C.M.G. two years later. He held the Osmanieh of the 2nd and 3rd Class, and the Medjidie of the 2nd Class and Grand Cordon, and was a Pasha in Egypt.

Surg.-Comdr. Horace Bryden Hill has been appointed an Esquire of the Order of the Hospital of St. John of Jerusalem in England.

Medical News.

UNIVERSITY OF LIVERPOOL.—The following candidates were successful at the examination recently held:—

Diploma in Public Health.—Mary A. S. Deacon, M.B., B.S.; G. I. Griffiths, M.R.C.S., L.R.C.P.; Mary E. Illingworth, M.D.; Phoebe A. Ince, M.D.; J. B. Murphy, M.B., B.Ch., B.A.O.; A. E. Richmond, M.R.C.S., L.R.C.P.; W. Williams, M.B., Ch.B.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—A meeting of Council was held on Jan. 12th, Sir Anthony Bowlby, K.C.B., President, in the chair. Plans prepared by the architect for alterations in the College to make room for the Army Medical War Collection were approved. The President reported that Sir John Bland-Sutton had consented to deliver the next Hunterian oration, and he was accordingly appointed Hunterian orator for 1923. The President reported that he had nominated Dr. H. B. G. Newham, C.M.G., of the London School of Tropical Medicine, as the representative of the College on the committee for organising a section of the British Empire Exhibition devoted to tropical diseases and their prevention. The following diplomas were conferred conjointly with the Royal College of Physicians:—

Diploma in Public Health.—J. Ashforth, Glasgow and Sheffield; C. F. Chenoy, Bombay and Univ. Coll.; Elsie E. Cowporthwaite, Univ. Coll.; A. Dasgupta, Calcutta and Univ. Coll.; H. Ellis, St. George's and Cardiff; R. Govan, Edinburgh and Roy. Inst. Public Health; W. A. Hawes, Guy's and Univ. Coll.; T. F. Kennedy, Cork and Roy. Army Med. Coll.; Evelyn C. McD. McGregor, Glasgow and Univ. Coll.; J. R. Mitchell, Glasgow and Middlesex; C. W. Narbeth, St. Bart.'s; A. K. H. Pollock, St. Bart.'s and King's Coll.; J. L. Priston, London and Greenwich; G. V. S. Rodriguez, Edinburgh and King's Coll.; G. W. R. Rudkin, Univ. Coll.; G. R. A. de M. Rudolf, King's Coll.; Elizabeth D. Russell, Royal Free and Univ. Coll.; C. Ryles, Edinburgh and Roy. Army Med. Coll.; P. N. Seth, Punjab and King's Coll.; C. R. Smith, Guy's; J. A. B. Snell, Cambridge and Univ. Coll.; A. T. Stanton, Toronto and King's Coll.; W. Tarr, Edinburgh and King's Coll.; and N. L. Varma, Allahabad and Univ. Coll.

Diploma in Tropical Medicine and Hygiene.—K. M. Bharucha, Bombay; A. H. Butt, Punjab; G. N. Cossery, Cairo; J. D. Dimock, Middlesex; G. D. English, Edinburgh; E. S. Godlieb, Ceylon and Edinburgh; A. L. Gregg, Dublin; E. P. Hicks, Cambridge and St. Bart.'s; H. O. Hofmeyr, Dublin; C. U. Lee, Glasgow; M. C. Madhok, Dundee; J. Pedris, Ceylon; Adeline Reubens, Bombay and Edinburgh; S. P. Samuel, Singapore; B. Shaha, Calcutta; A. D. Soares, Bombay; and F. G. Spear, Cambridge and St. Thomas's. (All of these candidates received part of their training at the London School of Tropical Medicine.)

Diploma in Psychological Medicine.—J. S. Annandale, Aberdeen; M. A. Cholmeley, St. Bart.'s; V. L. Connolly, Belfast; G. de H. Dawson, Middlesex; Marjorie E. Franklin, Royal Free; J. K. C. Laing, Melbourne; J. MacInnes, Glasgow; J. E. Martin, Univ. Coll.; H. F. Maudsley, Melbourne; J. F. Penson, London and Oxford; J. F. Powell, St. George's; E. S. Rose, St. Bart.'s; and G. T. Walker, Marguerite Wilson, and H. Yellowlees, Glasgow.

Dr. William Brown, Wilde Reader in Mental Philosophy, University of Oxford, will be giving a course of seven public lectures on Psychology and Psycho-analysis at the Examination School on Thursdays at 5.30 P.M., commencing Jan. 26th.

HUNTERIAN SOCIETY.—The annual dinner will be held on Wednesday, Feb. 8th, at the Trocadero Restaurant, London, W. 1, at 7 P.M. for 7.30, the President, Mr. Russell J. Howard, in the chair. Ladies will be invited. The price of tickets is 12*s.* 6*d.* each, exclusive of wine, and applications should be sent to the hon. sec., Dr. R. L. Mackenzie Wallis, 105, Harley-street, London, W. 1.

TUBERCULOSIS SOCIETY.—A general meeting of the Society will be held at the Margaret-street Hospital, Margaret-street, London, W. 1, on Monday, Jan. 23rd, at 7.30 P.M., when the report of the subcommittee on classification, the report of the executive committee on revision of constitution of the Society, and the report of the Joint Tuberculosis Committee and constitution thereof will be discussed.

DURHAM UNIVERSITY COLLEGE OF MEDICINE.—A reunion dinner for graduates and undergraduates will be held in the Grand Assembly Rooms (lower suite), on Thursday, Jan. 26th, at 7.15 P.M. The guest of the evening will be Mr. Cecil A. Cochrane, who has recently presented playing fields to the College of Medicine and to Armstrong College, and Prof. H. Brunton Angus will preside. Tickets for graduates and guests (15*s.*) and for undergraduates (7*s.* 6*d.*) may be obtained from Mr. W. Graham, College of Medicine, Newcastle-on-Tyne, before Jan. 23rd.

HARVEIAN SOCIETY: ANNUAL MEETING.—The annual general meeting of this society was held at 11, Chandos-street, W. 1, on Jan. 12th. The formal business having been completed, Dr. G. de B. Turtle, the retiring President, delivered an interesting address entitled Some Points on Spasm in the Alimentary Tract. The thanks of the Society to the retiring President were proposed by Dr. A. Routh and seconded by Prof. F. Langmead, and carried by acclamation. The Society then expressed its hearty approval of the work of the other officers and Dr. W. J. Frankish replied on their behalf. Sir William Willcox, the new President, was then invested and installed in the chair.

THE LATE DR. J. SIMPSON.—The death of Dr. John Simpson, an esteemed medical man who had been in practice in Belfast for nearly half a century, took place at his residence on Jan. 11th at the age of 78. Dr. Simpson qualified M.D. Q.U.I. and L.M. in 1879 from Queen's College, Belfast, after an unusually distinguished career as a student. In 1880, in conjunction with the late Dr. H. S. Purdon, he was instrumental in founding the Belfast Provident Institution for Chest Diseases, which ultimately developed into the Forster Green Hospital for Consumption at Fortbreda Park. Dr. Simpson was for many years one of the physicians attending this institution. His son was assistant surgeon on board the *Titanic* and sank with the ship.

INTERNATIONAL SOCIETY OF THE HISTORY OF MEDICINE.—A meeting of the permanent committee of this Society was held at the Faculty of Medicine in Paris on Jan. 7th. Prof. Ménétrier (France) presided in the absence of Dr. Tricot-Royer (Belgium). There was a large attendance, including delegates from Belgium, Denmark, France, Great Britain, Holland, Norway, Poland, and Switzerland. The statutes of the Society were adopted. It was decided that the Society should meet in Congress in London, at the house of the Royal Society of Medicine, on July 17th-22nd next, and afterwards every three years in any town selected by the general assembly. The subscriptions for membership of the Society, including the Congress, were fixed at 40 fr.; for membership of the Congress in London only, 30 fr.; and for students, associates, and relations of members, 10 fr. Subscriptions from countries other than France were to be paid in the equivalent value in the nation's coinage independently of the exchange. For England the subscriptions will be as follows: For members of the International Society, including annual subscription, £1 12*s.*; for members of the London Congress only, £2; and for associates, students, and relations of members, 8*s.* Members of the Society and those joining for the Congress will be entitled to receive a copy of "Liber Memorialis," or volume of the proceedings, which will be published after the meeting.

At the forthcoming Congress in London papers will be read on the History of Medicine in all its branches (medicine, surgery, dentistry, pharmacy, veterinary surgery, &c.), and a programme of the meetings and entertainments to be held in connexion with the Congress will be shortly issued. All communications should be addressed to the general secretary, Dr. J. D. Rolleston, 21, Alexandra Mansions, King's-road, London, S.W. 3.

Mr. W. H. Dolamore, M.R.C.S., L.D.S., has been elected to a seat on the board of the Medical Sickness, Annuity and Life Assurance Society, Limited.

COSSHAM MEMORIAL HOSPITAL, KINGSWOOD.—Although this hospital is richly endowed, the provision of a much-needed X ray outfit out of income has been impossible. The workpeople of the area have therefore collected the requisite sum, £100 of which was raised by two girls working in one of the boot factories.

BRISTOL DISPENSARY.—The report of this institution for 1921 showed that, in spite of a large increase in expenditure, chiefly due to an increase in salaries, the deficit on the year's work had been under £300, and this had been almost wholly met by realising legacies.

BELLAHOUSTON HOSPITAL.—At the monthly meeting of the Fellows of the Royal Faculty of Physicians and Surgeons of Glasgow, held on Jan. 9th, the following resolution was passed:—

"After careful consideration the Faculty are of opinion that the report of the Committee of Inquiry into the management of Bellahouston Hospital affords a complete vindication and exoneration of the administration of the hospital and of the medical and surgical staffs."

METROPOLITAN ASYLUMS BOARD.—On Jan. 14th the memorial tablet erected by the Board in memory of members of the staff who fell in the war was unveiled by the chairman, Canon Sprankling. He stated that 1649 of the Board's staff joined the forces, 1493 men (being 57 per cent. of the Board's male staff) and 156 women. 104 decorations and honours were gained by these employees. 140 men were invalided from the forces; 82 resumed their former occupations under the Board; 13 were permanently incapacitated and were allotted special duties, 6 were pensioned by the Board, the remainder being pensioned by the Government did not rejoin the service. The Board are at present employing over 7 per cent. of disabled men amongst their male staff. The memorial, which was designed by Mr. J. N. Comper, consists of a panel upon which the dedicatory inscription and 132 names of the officers of the Board who gave their lives are cut.

LOCAL AUTHORITIES AND CLEAN MILK.—The Hove Town Council recently had samples taken from each vendor in the borough, and the results showed that while some of the samples were not entirely satisfactory as regarded cleanliness, all were good samples from the point of view of quality, and in no case did the analyst report the sample unfit for human consumption. The Council has pointed out to the vendors and the farmers the importance of cleanliness being observed. The Sanitary Committee in a report has called the attention of the Council to the fact that under the present legislation legal proceedings had no prospect of success unless it could be proved that the milk was tuberculous, or that it came from a cow suffering from any of the diseases specified in the first schedule to the Sale of Food and Drugs Act, 1914. The Council, at a meeting on Jan. 12th, decided to urge the Ministry of Health to take steps to strengthen the hands of local authorities in this respect.

THE LATE SIR JOHN KIRK.—Sir John Kirk, G.C.M.G., K.C.B., F.R.S., who died at his residence at Sevenoaks, Kent, on Jan. 15th, was in his ninetieth year. The second son of the Rev. John Kirk, of Arbirlot, he was educated at Arbroath and at Edinburgh University, where he graduated M.D., L.R.C.S. Edin. in 1854. During the Crimean war he served in Turkey, being appointed assistant physician at the Renkioi hospital in the Dardanelles; later he accompanied Livingstone as chief officer, physician, and naturalist to the explorer's Zambesi expedition of 1858–64. Kirk returned to England in 1863, classified and arranged his botanical collection at Kew, and declined a permanent post at the gardens, returning to Africa in 1866 as surgeon to the political agency at Zanzibar. His activities soon became chiefly political; he was appointed vice-consul, then assistant political agent, and in 1873 agent and consul. In the same year he signed the treaty with the Sultan of Zanzibar whereby the slave market was closed, and was appointed consul-general immediately afterwards. Retiring on a pension in 1887 Kirk was British Plenipotentiary at the African Congress held in Brussels, 1889–90, a Special Commissioner to the Niger Coast in 1895, and a member of the Government committee for the construction of the Uganda railway. He was Hon. LL.D. Edin., D.C.L. Oxf., Sc.D. Camb., Fellow of the Linnæan Society, Fellow and for some years foreign secretary of the Royal Geographical Society; he became F.R.S. in 1887, and was a member of the first committee of the Royal Society appointed to investigate the subject of the tsetse fly, being also interested in research into tropical diseases.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—The full syllabus of the special course in surgery, which will begin on Feb. 20th, will be published shortly. The course will cover a period of six weeks, concluding on Saturday, April 1st, and the following general and special hospitals will take part: North-East London Post-Graduate College, Cancer Hospital, Chelsea Hospital, Hampstead General Hospital, National Hospital for the Paralysed and Epileptic, Queen's Hospital for Children, Royal Free Hospital, Royal National Orthopædic Hospital, Royal Northern Hospital, St. Mark's Hospital, and St. Peter's Hospital. The course will consist of a morning and afternoon session and will be so arranged as to involve a minimum of travelling each day. Further particulars and copies of the syllabus when available will be sent on application to the Secretary, Fellowship of Medicine, 1, Wimpole-street, London, W. 1.

LIVINGSTONE COLLEGE.—The annual report for 1920–21 has recently been issued of this College, which was founded in honour of Dr. Livingstone in order to give to missionaries going to places where medical aid is not available a simple training in medicine, surgery, and tropical hygiene. Women are now admitted to the College and five female students entered for the whole or part of last session. The total number of general entries did not come up to pre-war standards, but 36 students entered for varying periods during the session, 34 took the vacation course in July, and 42 entered for the short courses on Personal Care of Health in the Tropics. The financial statement shows a deficit of £90 on the year's working, thus, with the deficits of previous years, making an accumulated excess of expenditure over income of £1021. Regret is expressed by the committee that ill-health compelled Dr. L. E. Wigram to retire from the office of Principal. His place has been taken by the Vice-Principal, Dr. Tom Jays.

ABOLITION OF DISTRICT HOSPITALS IN IRELAND.—The only part of the scheme of Poor-law and medical reform put forward by the Local Government Department of Dail Earann, which is receiving serious opposition in certain quarters, is that which suggests the abolition of the district hospitals. From counties as dissimilar as Wexford and Galway criticism of this proposal has appeared. A meeting of medical practitioners of Co. Galway was held last week, when exception was taken to the proposal to give up the hospitals in the Connemara part of the county. It was pointed out that typhus and typhoid are endemic in this area; that it was difficult even at present to persuade the friends of patients to permit them to be taken to hospital; and that this reluctance would be greatly increased if the only hospitals available were a long distance away. Part of Connemara is, in fact, nearly 50 miles from the nearest proposed hospital. It is further pointed out that a large number of medical men have fallen victims to typhus in Galway because of the home conditions under which they have so often to attend patients. The Galway practitioners also passed a resolution demanding that the medical provisions of the present amalgamation scheme should be suspended until a commission, on which the medical profession would be adequately represented, had formulated a scheme for all efficient Irish medical services suitable to the requirements of the country.

THE LATE DR R. C. HOLMAN.—The death of Dr. Robert Colgate Holman, which occurred at Midhurst on Jan. 13th, removes a member of a family associated with medicine in the county of Sussex for a century. Dr. Holman was one of the oldest residents in the Midhurst district and was held in the highest esteem by all classes. Born in 1848 Dr. Holman was the youngest son of the late Mr. Henry Holman, who qualified in 1823 and practised for many years in the East Hoathly district of Sussex. Robert Colgate Holman was educated privately at Brighton, and received his medical training at Guy's and the London Hospitals. He took the L.S.A. diploma in 1870 and became M.R.C.S. in the following year. He was house surgeon at the London Hospital for a time, and afterwards resident medical officer at Queen Adelaide's Dispensary, Bethnal Green. From here he started practice at Wantage in Berkshire, and later moved to Keighley, Yorkshire, where, besides conducting an extensive private practice, he held a number of appointments, including that of surgeon to the Great Northern Railway Co. He remained at Keighley 11 years, and in 1885 returned to his native county and settled at Midhurst. Dr. Holman took a lively interest in local affairs and was a staunch Conservative. He was in his day a renowned rifle shot and a keen cricketer. Dr. Holman had a gracious and winning personality, and his death after a year's illness will be deplored by a large circle of friends. He left one son and one daughter, his wife predeceasing him.

Henry Edward Garrett, M.D. Durh., who died on Jan. 13th, at the age of 65 years, was surgeon to the G Division of the Metropolitan Police and medical officer to No. 1 District of the Shoreditch Union.

HASTINGS TUBERCULOSIS CARE COMMITTEE.—The annual meeting was held on Jan. 10th in the Town Hall, Hastings. The third annual report stated that 194 applications had been received up to June 30th, 1921. A most important part of the Committee's activities was that of sending into the country children threatened with tuberculosis. Clothing, nourishment, and so forth had been supplied from time to time, and about 50 ex-service patients or their dependents had been assisted. The financial position had given the Committee much anxiety, and had seriously curtailed their work. At one time they found themselves with only £1 in hand, but £127 6*s.* 11*d.* were raised by entertainments. Only £69 9*s.* 8*d.* had been received in subscriptions, and the Committee earnestly appealed for a larger list. Dr. Nathan Raw, M.P., gave an address to the meeting on tuberculosis as an infectious but preventable disease.

THE LATE DR. E. M. SYMPSON.—Dr. Edward Mansel Sympson, who died at his residence, Deloraine Court, Lincoln, in his sixty-second year, was the son of Mr. Thomas Sympson, F.R.C.S. Eng., and was educated at Lincoln, Shrewsbury, and Gonville and Caius College, Cambridge, where he graduated M.A., M.B., B.Ch. in 1887. On leaving Cambridge he went to St. Bartholomew's Hospital, where he held appointments as house surgeon and house physician, and in 1888 began to practise in Lincoln. Amongst his professional appointments were those of surgeon to the Lincoln County Hospital and consulting surgeon to the Lincoln General Dispensary; he took his M.D. degree in 1890. Various articles from his pen appeared in the leading medical journals; apart from his high professional standing he was an accepted authority on the history and topography of Lincolnshire.

ULSTER MEDICAL SOCIETY.—A meeting of this Society was held on Jan. 12th, Dr. Robert Hall, the President, being in the chair. Dr. W. G. Mackenzie read a paper on the rupture of a Cæsarean section scar. Prof. C. G. Lowry read a paper on maternal mortality in which he analysed the deaths in Ireland during the year 1920 attributable to pregnancy and child-bearing. In this year there were 550 deaths. The deaths per 1000 births amounted to 6·26. He contrasted, as Victor Bonney has done in England, the death-rates for the preceding half century, and from the figures available it appeared that the death-rate had not shown the decline which would have been expected or desired. As in England and Wales and in Scotland, the majority of the deaths were due to septic conditions, over 40 per cent. of those occurring in 1920 being attributable to sepsis. He discussed the various factors which contributed to this regrettable state of affairs, particular stress being laid on the difficulties of preserving proper surgical technique in the surroundings with which the obstetrician was confronted whilst attending the poorer classes in their own homes. The importance of more vigilance during pregnancy was pointed out. Over 14 per cent. of the maternal deaths in Ireland during 1920 were due to albuminuria and convulsions—conditions which, with efficient ante-natal care, should not be operative in swelling the mortality figures. The paper was discussed by the President, Drs. Mackenzie, Storey, Trimble, Rentoul, Gaussen, Shaw, and Houston, after which Prof. Lowry replied.

Appointments

HAWORTH, J. K., M.D., M.S. Durh., has been appointed Medical Superintendent to St. Mary's Hospital, Paddington.

MACAULAY, H. M. C., M.B., B.S. Lond., D.P.H., Assistant Medical Officer of Health for Dover.

SOOTHILL, V. F., M.D., B.Ch. Camb., Medical Officer of Health to the Ilford Urban District Council.

Certifying Surgeons under the Factory and Workshop Acts:—COLMAN, H. C., M.D., C.M. Edin. (Broughty Ferry); SALT, C. E., M.B., C.M. Edin. (Chirk); NEWTON, P. A., M.B., Ch.B. Birm. (Menai Bridge).

Vacancies.

For further information refer to the advertisement columns.

Aylesbury, Royal Buckinghamshire Hospital.—Hon. Radiologist.

Birmingham and Midland Hospital for Women.—Visiting Path. £150.

Birmingham General Hospital.—Res. M.O. £155. Two H.P.'s and one H.S. Each £100.

Bootle Borough Hospital.—Sen. and Jun. H.S. £200 and £150.

Bristol, Cossham Memorial Hospital, Kingswood. — Res. H.S. £200.

Bromley Borough.—Asst. M.O.H.

Buenos Aires British Hospital.—Asst. Res. M.O. £150.

Charing Cross Hospital.—Asst. S.

Colindale Hospital, Hendon.—Jun. Asst. M.O. £122.

Doncaster Royal Infirmary and Dispensary.—Sen. and Jun. H.S.'s, £220 and £200.

Durham County Council.—Asst. Sch. M.O. £600.

East London Hospital for Children, &c., Shadwell.—Asst. Phys. and Ophth. S.

Hospital for Sick Children, Great Ormond-street.—Res. Med. Supt. £300.

Ipswich, East Suffolk and Ipswich Hospital.—H.S. and H.P. £150 each.

Leeds Hospital for Women and Children.—Two H.S.'s. £50.

Leeds Public Dispensary.—Sen. Res. M.O. £250.

London Hospital, Whitechapel.—Surg. Reg. £365.

Manchester, Baguley Sanatorium.—Second Asst. M.O., £350.

Manchester Royal Infirmary.—Res. M.O. £200. Asst. M.O. and Jun. H.S. £100 each.

Ministry of Pensions.—Res. M.O. at Birmingham. £500. Jun. M.O.'s at Bath and Grantham. £350 each.

Newcastle-upon-Tyne Hospital for Sick Children.— Hon. Asst. S. and Hon. Asst. P.

Nottingham, Children's Hospital.—Res. H.P. £180.

Recuperative Hostels, 20, Hanover-square.—Res. M.O. £500.

Rochdale Infirmary and Dispensary.—Jun. H.S. £200.

Royal Chest Hospital, City Road.—P.

Royal Free Hospital, Gray's Inn-road.—Surg. Reg. £250.

Royal London Ophthalmic Hospital, City-road.—Asst. S.

Royal Northern Hospital, Holloway.—P. to Out-patients.

Ryde, Royal Isle of Wight County Hospital.—Res. H.S. £200.

St. Helens, Lancs, Pilkington Special Hospital.—H.S. £300.

St. Helens County Borough.—Female Asst. M.O.H. £500.

St. Marylebone Hospital, Ladbroke-grove.—Third Asst. M.O. £300.

St. Thomas's Hospital.—Visiting Anæsth.

Seamen's Hospital, Albert Dock.—H.S. £150.

Sheffield Royal Hospital.—Asst. Cas. O. £150.

Southampton, Royal South Hants and Southampton Hospital.—Jun. H.S. £150.

South London Hospital for Women, Clapham Common, S.W.—H.S. and H.P. £100 each.

Stoke-on-Trent County Borough.—Asst. Tub. O. £601.

University of London.—Examiners.

Wokingham, Berks, Pinewood.—Second Asst. M.O. £178.

Wolverhampton and Midland Counties Eye Infirmary. — H.S. £200.

The Chief Inspector of Factories, Home Office, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Allendale, Ampthill, Deal, Polesworth, Ramsbottom, and Yaxley (Huntingdon). There will be a vacancy at Kingsbridge (Devon) in March.

Births, Marriages, and Deaths.

BIRTHS.

BROOKES.—On Jan. 13th, at Emperor's Gate, South Kensington, the wife of Walter G. Brookes, of a daughter.

CASTLE.—On Jan. 12th, at Upper Berkeley-street, W., the wife of Dr. W. F. Castle, of a son.

DRURY.—On Jan. 4th, 1922, at Stafford, the wife of Kenneth K. Drury, M.C., M.D., of a son.

MARRIAGES.

LANGDON-DOWN—TURNBULL.—On Jan. 14th, at St. John's, Hildenborough, Reginald L. Langdon-Down, M.B., M.R.C.P. of Normansfield, Hampton Wick, to Ruth Turnbull, M.B.E., elder daughter of the late William Abbott Turnbull, Esq., J.P., and Mrs. Turnbull, of the Mill House, Hildenborough.

MASON—JOLL.—On Jan. 12th, at St. Marylebone Parish Church, London, Charles Arthur Mason, M.B., Ch.B. Edin., D.P.H. Lond., to Mary Emmeline Joll, M.D. Lond.

DEATHS.

HEPPENSTALL.—Killed in action on Dec. 11th, 1921, near Mohd Khel, Waziristan, N.W. Frontier, India, Capt. C. H. Heppenstall, I.M.S.

HOLMAN.—On Jan. 13th, at Midhurst, after a long illness, Robert Colgate Holman, M.R.C.S., L.R.C.P.

MARSHALL.—On Jan. 12th, at 1, Douglas Crescent, Edinburgh, Elizabeth Mackie, wife of Lieut.-Colonel D. G. Marshall, I.M.S. (retired).

O'KEEFFE.—On Dec. 23rd, 1921, at Richmond, Thomas Francis O'Keeffe, Surgeon Commander, R.N. (retired), aged 47 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

INDEX TO "THE LANCET," VOL. II., 1921.

THE Index and Title-page to Vol. II., 1921, which was completed with the issue of Dec. 31st, will shortly be published. A copy will be sent gratis to subscribers on receipt of a post-card addressed to the Manager of THE LANCET, 1, Bedford-street, Strand, W.C. 2.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

Monday, Jan. 23rd.

ODONTOLOGY: at 8 P.M.
Casual Communications:
Mr. Stanley Mummery: A Case of Mandibular Sarcoma in an Infant.
Mr. Montagu Hopson: A Maori Skull of Dental Interest.
Paper:
Mr. Douglas Gabell: The Causes, due to Vulcanite, of the Misfit of Dentures, and some Remedies.

Tuesday, Jan. 24th.

MEDICINE: at 5 P.M.
Discussion on "The Diagnosis of Gastric Ulcer."
Speakers: Dr. C. Bolton, Sir Cuthbert Wallace, Dr. Ryffel, Dr. A. E. Barclay, and Dr. W. Gordon.
Members of other sections are cordially invited to attend this meeting.
N.B.—Will members kindly note the change in time.

Wednesday, Jan. 25th.

SOCIAL EVENING.
Fellows and their friends will be received by the President and Lady Bland-Sutton at 8.30 P.M. Prof. Elliot-Smith will deliver a short address at 9 P.M. on "The Rhodesian Skull."
The library will be open, and various objects of interest will be exhibited. Music, light refreshments, and smoking.
N.B.—All Fellows and their friends are cordially invited. No tickets are required.
Will Fellows who know of Dominion and Foreign Practitioners who are visiting this country send their names and addresses to the Secretary in order that invitations to attend the Social Evenings may be sent to them.

Thursday, Jan. 26th.

UROLOGY: at 8.30 P.M.
Pathological and Clinical Evening: The following cases and specimens will be shown by:—
Mr. Cecil Rowntree: Specimen of a Sarcoma of Kidney removed from a child; and the Patient herself.
Mr. Frank Kidd: (1) Specimen and Sections of a Simple Tumour removed from the bladder of a young adult. (2) Two Patients illustrating Benefit of Total Extirpation of the Penis and Inguinal Glands for Carcinoma.
Dr. Ward (Ipswich): Case of Bladder Diverticulum.
Mr. Cyril Nitch: (1) A Ureteric Calculus of unusual size and shape. (2) A Photomicrograph of a Spindle-celled Sarcoma of the Urachus invading the Bladder.
Mr. Lawford Knaggs: A Ureteric Calculus.
Mr. James Macalpine: (1) Operation Specimen of Uterocele. (2) Six Cystin Renal Calculi.

Friday, Jan. 27th.

STUDY OF DISEASE IN CHILDREN: at 5 P.M. (Cases at 4.30 P.M.)
Cases will be shown at 4.30 P.M.
EPIDEMIOLOGY AND STATE MEDICINE: at 8 P.M.
Paper:
Dr. S. Monckton Copeman, Dr. R. A. O'Brien, Dr. A. J. Eagleton, Mr. A. T. Glenny: Experiences with the Schick Test and Active Immunisation against Diphtheria.
PATHOLOGY.
Members of this Section are cordially invited to attend the above meeting of the Section of Epidemiology, and take part in the discussion.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.
MONDAY, Jan. 23rd.—8.30 P.M., Dr. F. J. Poynton and Dr. J. W. McNee: A Case resembling Leukæmia, but presenting unusual and pathological features. Mr. T. H. Kellock: A Method of Treating Abscesses. Dr. W. Broadbent: Observations on Heart Disease.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.
MONDAY, Jan. 23rd (5 P.M. each day), Hunterian Lectures:—Sir Arthur Keith: The European Face and its Chief Variations in Type.
WEDNESDAY.—The Study of Certain Aberrant Types: Bushman, Eskimo, Lapp, Ainu.
FRIDAY.—The Facial Characteristics of the Races Native to India.
FELLOWSHIP OF MEDICINE SPECIAL POST-GRADUATE COURSE. Closes Feb. 18th.
MONDAY, Jan. 23rd.—10 A.M., Middlesex Hospital: Dr. T. Izod Bennett: Investigation and Treatment of Gastro-Intestinal Disorders (1). 1.15 P.M., St. George's Hospital: Dr. Donaldson: Post-mortem Demonstrations.
TUESDAY.—11 A.M., St. Marylebone General Dispensary: Dr. Eric Pritchard: Artificial Feeding. 2 P.M., Cancer Hospital: Sir Charles Ryall: Demonstrations and Operations.
WEDNESDAY.—10 A.M., Paddington Green Children's Hospital: Dr. G. A. Sutherland: Heart Disease in Children. 2.30 P.M., St. Peter's Hospital: Mr. Clifford Morson: The Causes and Treatment of Difficult Micturition.
THURSDAY.—10 A.M., Middlesex Hospital: Dr. Bennett: Investigation and Treatment of Gastro-Intestinal Disorders (2). 3 P.M., St. Marylebone General Dispensary: Dr. Eric Pritchard: Modification of Milk. 6 P.M., Middlesex Hospital: Dr. MacCormac: V.D. Methods and Selected Cases.
FRIDAY.—10 A.M., Hospital for Epilepsy and Paralysis: Dr. Campbell Thompson: Examination of Central Nervous System. Dr. Golla: Tumours of the Brain and Spinal Cord. 2 P.M., Cancer Hospital: Mr. W. Ernest Miles: Demonstrations and Operations.
SATURDAY.—11.30 A.M., Western Hospital, Fulham: Dr. R. M. Bruce: Selected Cases of Infectious Diseases. 2 P.M., Hospital for Consumption and Diseases of the Chest.
NATIONAL HOSPITAL FOR DISEASES OF THE HEART POST-GRADUATE COURSE, Westmoreland-street, Marylebone, W.
MONDAY, Jan. 23rd.—5.30 P.M., Dr. Parkinson: Dropsy.
Daily:—10 A.M. and 2 P.M., Out-patients and In-patients.
NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC POST-GRADUATE COURSES, Queen-square, W.C.
MONDAY, Jan 23rd.—12 noon, Dr. Greenfield: Cerebro-spinal Fluid (2). 2 P.M., Dr. Hinds Howell: Out-patient Clinic. 3.30 P.M., Dr. Walshe: Afferent Paths in the Nervous System and Effects of Lesions Thereon (3).
TUESDAY.—2 P.M., Dr. Grainger Stewart: Out-patient Clinic. 3.30 P.M., Dr. Risien Russell: Sciatic Neuritis.
THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., The Pathogenesis of Involuntary Movements (2).
FRIDAY.—2 P.M., Dr. Gordon Holmes: Out-patient Clinic. 3.30 P.M., Dr. Collier: Vascular Disease of the Nervous System (2).
WEST LONDON POST GRADUATE COLLEGE, West London Hospital, Hammersmith, W.
MONDAY, Jan. 23rd.—5 P.M., Dr. Arthur Saunders: Gall-stones.
TUESDAY.—5 P.M., Mr. Addison: Tumours of the Breast.
WEDNESDAY.—5 P.M., Dr. Burnford: *B. Coli* Infections.
THURSDAY.—5 P.M., Mr. Aslett Baldwin: Some Points in Rectal Surgery. (Open to all Medical Practitioners.)
FRIDAY.—5 P.M., Dr. Burrell: Artificial Pneumothorax.
Daily:—10 A.M., Visit of Post-graduates to Wards. 2 P.M., In-patient, Out-patient Clinics and Operations.
ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, Leicester-square, W.C.
THURSDAY, Jan. 26th.—6 P.M., Chesterfield Lecture, Dr. W. Knowsley Sibley: Alopecia and its Treatment.
SALFORD ROYAL HOSPITAL.
THURSDAY, Jan. 26th.—4.30 P.M., Mr. Jefferson: Some Remarks on the Syndrome of Cerebral Compression.
MANCHESTER ROYAL INFIRMARY POST-GRADUATE CLINIC.
TUESDAY, Jan. 24th.—4.30 P.M., Dr. J. H. Ray: Some Points in the General Management of Fractures.
ST. MARY'S HOSPITALS POST-GRADUATE LECTURE, Whitworth-street West Branch, Manchester.
FRIDAY, Jan. 27th.—4.30 P.M., Dr. Fothergill: Post-menopause Atrophic Conditions.
MANCHESTER FRENCH HOSPITAL, POST-GRADUATE LECTURES, 24, Acomb-street, Whitworth Park.
THURSDAY, Jan. 26th.—4.15 P.M., Mr. Howard Buck: Hernia.
ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.
Lectures on Tuberculosis and Public Health.
WEDNESDAY, Jan. 25th.—4 P.M., Dr. A. C. Inman: Laboratory Aids to Diagnosis of Tuberculosis Infection.

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SOME RELATIONS BETWEEN VEGETABLE AND HUMAN PATHOLOGY.[1]

BY DR. E. J. BUTLER,
DIRECTOR OF THE IMPERIAL BUREAU OF MYCOLOGY.

THE differences in the organisation of the higher plants and animals are such, especially in the absence of true circulatory, nervous, and digestive systems in plants, as to preclude any comparison between the great mass of the disorders from which the two kingdoms suffer. But since in their ultimate structure they are composed of the same cellular units, and since they are exposed to the attacks of similar parasites, it would be strange if there were no points of contact between vegetable and animal pathologists. Vegetable pathology is a younger science than that of man and the higher animals, and there are as yet no handbooks that give in any detail a comparative survey of the pathological processes in plants. But I think there are grounds for hoping that the older science may gain something from the study of certain disease phenomena in plants. The directions in which this may be sought are in certain branches of cellular pathology, in the diseases involving changes in physiological processes such as altered metabolism, in certain classes of parasitic and virus diseases, and in the effect of environmental conditions on the interaction of host and parasite.

I propose to give only a very few instances of disease processes in plants that have some analogy to those in the animal kingdom, but without attempting to define their exact bearing on particular aspects of human pathology. While they are not specially confined to the tropics they are prevalent there, and my own actual experience has been almost entirely tropical.

The Crown Gall Tumour.

The first is tumour formation in plants as exhibited by the well-known crown gall tumour caused by *Bacterium tumefaciens*. I have recently had an opportunity of discussing with Dr. Erwin F. Smith, of Washington, this disease, which he has been studying for the last 18 years. His work is regarded by plant pathologists throughout the world as of great value. The tumours caused are usually hyperplasia, arising from the repeated division of the cells to produce a solid small-celled tumour tissue without cavities. The cells are often markedly embryonic in character and divide mitotically and amitotically. Secondary tumours frequently develop, often at a considerable distance and deep-seated in the tissues. They are not caused by migration of the bacteria across normal tissues, but by a definite outgrowth from the primary tumour in the form of a tumour-strand of infected cells of marked characters and easily recognised in section, though often only a few cells thick. Such strands have been traced for eight inches in length. The secondary tumours have the characters of the primary, so that if a leaf bears tumours secondary to one on the stem their structure will be a stem structure. Secondary tumours can also be produced by grafting a part of a primary tumour on a suitable part of the plant. Growth of the tumour is unlimited and devoid of polarity, and the destructive action on the plant is usually merely the result of pressure and crushing, though necrosis permitting secondary infection is common.

The structure of the tumour varies according to the tissue primarily infected. Most of them are of the ordinary ground or conjunctive tissue cells—e.g., in the cortex or pith—and are the nearest approach that one could expect to get in plants to sarcomata. There is no epithelium in plants, and the epidermal tissues are thin, usually a single layer, and hard to inoculate without involving the underlying ground tissue. But a few cases have been described in which the tumour appears to be composed mainly of epidermal elements, including hairs (the plant hair being an outgrowth from a single epidermal cell), and these may be compared with epitheliomata. The most interesting type, however, is undoubtedly the embryomata. These tumours, first detected as recently as 1916, are composed of a jumbled mass of young shoots and roots of usually incomplete structure having only bits of organs, but sometimes forming more or less complete dwarf shoots. The secondary tumours developed from these have usually the same embryonic teratoma structure.

The Organism Connected with Crown Gall.

The organism which causes crown gall is a cell parasite of a highly developed type, in which the host cell is not destroyed but is stimulated to increased activity. There are many such cases in plant parasites. To the best of its ability the parasite aims at preserving the life of the host cell for its own needs. That it over-stimulates the cells, causing death by crushing and necrosis, may be regarded more or less as an accident. *Bacterium tumefaciens* can be isolated and cultivated, so that its morphology and characters are well known. It is rare in the tissues, at least in an active state; in one case it was estimated that there were only 200 living bacteria per cubic centimetre of the tumour. But perhaps the most significant thing that I learned from Dr. Smith was that, contrary to his earlier belief, he is not now certain that he has ever recognised the organism in the tissues. What he previously saw he now thinks were only cell-inclusions or chondriomes. Thus we have a parasite capable of causing a tumour having all the characters of a malignant growth; the organism has been isolated, grown in pure culture, and new tumours produced at will with it, but it is not with certainty to be recognised in the tissues of the tumour.

More recently Dr. Smith has been able to produce experimentally small tumours of limited growth, having the characters of incipient crown galls, by injecting in suitable parts of plants certain of the diffusible products of the metabolism of *Bacterium tumefaciens*, including ammonia, amines, organic acids, &c., and he considers that the tumour is ordinarily caused by the continual production of small quantities of these excreted products by the parasite.

Application to Cancer Research.

I am aware that the path of cancer research is strewn with the wrecks of parasitic theories, but the recent work on plant cancers, the experimental production of embryonic teratomata, the extreme difficulty of detecting the parasite in the cells (it is certainly *in*, not between the cells), and the evidence that it acts by the production of repeated small quantities of an excreted stimulus, makes it easy to understand the view held by Dr. Smith and other vegetable pathologists, that cancer will ultimately be found to be due to some similar cause.

The Mosaic Group of Diseases.

A second direction in which disease phenomena in plants may throw light on certain animal diseases is found amongst the obscure group of diseases which the vegetable pathologists are calling "virus" or "contagium" diseases. These are diseases in which ætiological studies suggest the presence of a parasitic agent but in which, with the means at our disposal, no parasite can be detected, and filtration through the Berkefeld filter does not cause a reduction in virulence. The number of such diseases in plants is large, but many of them have only recently been recognised. They have all certain characters in common, but they fall into several groups, the most important of which is that known as the "mosaic" group because its most obvious symptom is a variegated effect of light and dark green patches on the leaves. So rapidly have new cases of mosaic been recorded in the last few years that one is tempted to say that every cultivated plant has at least one such disease. Cross-inoculations show that while allied plants (as, for instance, potato and tomato) may suffer from the same mosaic, the mosaics of distantly related plants are usually distinct. These diseases are constitutional, the virus reaching all parts of the plant in three to four days after inoculation in the mosaic of cucumber. The incubation period before the first symptoms appear in this mosaic varies from 4 to 15 days, and in potato and cabbage mosaic from 20 to 30 days. In sugar-cane mosaic the virus is restricted in its distribution and may not reach every shoot. Many tissues and organs, though containing the virus, do not react to it in any way that has been hitherto detected. Also "carriers" have been found—i.e., plants that show no symptoms after inoculation yet contain infective virus in a transmissible form. Actual tissue reactions (cell modifications) are often caused in the leaves and fruit. Necrosis of the light areas in the leaves also occurs not uncommonly in the older stages. The other symptoms are due to deep-seated alterations in the physiological activities of cells and organs, revealing themselves in altered metabolism and abnormalities of growth (dwarfing, crinkling, or folding of flat surfaces, shortening of axes and, at times, proliferation). The disease is not usually fatal in annual plants, though death from weakness may occur. The reduction in vigour may be great or slight. Mosaic and allied diseases of potato in England may cause a reduction of over 50 per cent. in the yield, and in Bermuda losses up to 75 per cent. have been recorded. On the other hand, I recently saw fields of sugar-cane in Louisiana with 100 per cent. infection from mosaic, but was informed by the local plant pathologist that the loss of yield was slight though the disease has been present for seven years, and in other localities—e.g., Hawaii—had been known to reduce the sugar yield by 60 per cent. The so-called deterioration of many cultivated plants, such as potatoes, leading to the constant demand for new varieties, has recently been recognised to be, in nine out of ten cases, the result of the gradual accumulation of some one or other of these virus diseases.

[1] A paper read at the Royal Society of Tropical Medicine and Hygiene on Jan. 19th.

Methods of Transmission.

From the standpoint of comparative pathology what is important is the knowledge that has already been gained as to the methods of transmission and certain other characteristics of these virus diseases. So far as is known all these diseases are insect borne. There are other methods by which infection can be produced, but the normal method in nature is by insects, chiefly sucking insects, especially aphids. In no case has transmission by mere contact been demonstrated. In one case, curly top of beet, no other method of infection than through the insect (a leaf hopper, *Eutettix*) has been discovered, and in this case the insect has to be kept for a period of 24 to 48 hours after feeding on a diseased plant before it can inoculate a healthy one, after which it can remain infective for 100 days. This suggests that a part of the life-cycle of the parasite is passed in the insect. In most cases, however, the virus can be obtained by extracting the juice (cell sap) of a diseased plant and can be successfully inoculated on a healthy plant by injection into any part of the plant (tobacco mosaic) or into certain parts only (growing point in sugar-cane mosaic, any part but the root or flower in cucumber). It can also be transmitted often by crushing a diseased leaf on a healthy one so as to injure both tissues, or even (cucumber mosaic) by bringing the broken hairs of healthy and diseased leaves into contact. In such cases the virus is evidently in each individual cell. In spinach blight the crushed bodies of aphids that have fed on diseased plants are infective. In this disease, too, the offspring of infected aphids are infective occasionally. In certain cases the disease is carried in the seed borne by diseased plants, but in a good many this does not occur. There is much evidence that the virus travels in the plant through that part of the vascular system, the phloem, in which the elaborated sap is conveyed. This system does not reach to the seed, the plant embryo feeding entirely by osmosis. Recent studies show that certain aphids, including some that are known to carry mosaic, feed by inserting their very fine and flexible probosces into the cells of the phloem, avoiding other cells as a rule.

One other method of transmission must be mentioned. Even in the most refractory cases, as spinach blight, infection can be secured by grafting a diseased on to a healthy plant, provided organic union is obtained. After extraction from the plant life of the virus varies from only 24 hours (sometimes in cucumber mosaic) to a year or more (tobacco mosaic if dried). It is killed by a temperature usually of between 70° and 80° C., but can withstand exposure to very low temperatures. In some cases ordinary antiseptics kill it, but the tobacco mosaic is resistant to most weak antiseptics. The concentration in the sap is such that a needle drop can be diluted to 1000 without any loss of virulence, though virulence is reduced by a dilution to 10,000 (tobacco and cucumber). Filtration through porous filters depends on the size of the pore. The cucumber mosaic virus filters through the Berkefeld but not through the Chamberland; tobacco mosaic filters through both but is retained by powdered talc.

Though there are still a few vegetable pathologists who prefer the enzymic or toxic hypotheses to the parasitic explanation of these diseases, most agree that their study has made it necessary to assume that they are caused by ultramicroscopic living organisms. The mere fact that they have not been successfully grown in vitro has no weight with the vegetable pathologist, who is familiar with whole groups of parasitic fungi, such as the rusts, not one of which has ever been grown apart from its host plant. It is certain that no visible organism is present in extracted cell sap that is known to be highly infective. This does not preclude the possibility that the organism may have a visible stage, and indeed quite recently two independent workers have claimed to have discovered, in cells of sugar-cane and maize suffering from mosaic, bodies which in one case may perhaps be suggestive of a parasite not unlike a stage in *Rickettsia*.

Geographical and Seasonal Distribution of Certain Diseases.

Another set of problems of no less interest to the vegetable than to the animal pathologist is the geographical and seasonal distribution of certain diseases. The experimental study of the relations of plants to their environment is naturally much easier than those of human beings. In our botanic gardens we habitually grow tropical plants with success, being able to imitate their natural conditions. It is only recently, however, that plant pathologists have made use of their opportunities to study the influences of such climatic factors as humidity and temperature on plant disease. The results have been remarkable. It has been found possible to correlate the geographical distribution of a considerable group of plant diseases with the temperature and humidity reactions of the parasite and its host. In the simplest cases a single factor, such as the degree of relative humidity of the air, acts by limiting the development of the parasite. One of the best examples of this is a disease of the rice plant which I studied in India. It was strictly confined to a large rice area at the head of the Bay of Bengal, and while the main crop from July to December was often totally destroyed, the secondary crop in the spring entirely escaped, though it was shown by artificial inoculations to be equally susceptible. I found that the organism could neither move nor feed nor reproduce at an air humidity of below 90 per cent., while though it is actively mobile it is unable to feed or reproduce in water. At about 90 per cent. I got no infection, at 95 per cent. full infection. To be able to multiply and attack the rice plant it therefore requires moderately prolonged periods when the air humidity is over 90 per cent. These conditions occur only in certain limited areas in India during the second half of the year, and at a time when the disease was causing considerable alarm it was possible to state that the bulk of the rice-growing areas were not threatened. The meteorologic factor may act by affecting the receptivity of the host-plant. Thus in the vine, mildew infection is dependent on the condition of the stomata, through which the parasite enters. If these remain semi-closed, as in young leaves or in dry conditions, infection is impossible. Infection has been found to fail if the moisture of the soil in which the vine is growing is below 15 per cent. unless the air humidity is above 80 per cent. If the soil moisture is above 20 per cent. the stomata open widely enough to permit infection at air humidities above 40 per cent.

Meteorological Conditions and the Host-Parasite Complex.

But it would seem that in many cases the action of the meteorological factors on both the parasite and the host in their mutual relations—on what may be, for convenience, termed the host-parasite complex—has to be taken into account. In the onion smut, for instance, it is possible to get 100 per cent. or no successful infections according to the soil and air temperatures used. The onion seed will germinate at soil temperatures from 10° to 31° C., but the best top growth is got with a soil temperature of 20° to 25°. Infection by the smut fungus can be got freely from 10° to 25° C. but is slight at 27°. At a soil and air temperature of 25° C. a great many plants will outgrow the infection and recover, but at an air temperature even as high as 30 to 33° C. infection can be got if the soil temperature is kept below 25° C. In outdoor plantings the disease was completely inhibited when the mean soil temperature reached 29° C. and increased progressively with lower temperatures. The relation is believed to act chiefly through the host plant, as successful incipient infection can be got at the higher temperatures but the subsequent development of the fungus is inhibited. The geographical distribution of the disease in the United States, where it is absent from large areas in which onions are sown in the warm season, has been completely explained by this work.

Recently it has been shown that the severe outbreaks of epidemic malaria in the Punjab are governed by a set of temperature and humidity factors affecting both the malarial parasite and the insect host. With a warm-blooded animal like man the temperature factor is probably of slight importance, except in so far as it acts on the parasite while exposed to the air as in the external air passages. But in insect-borne diseases and in the life of the parasite outside its host these studies have a certain interest, and the recent discovery that so small a difference as 5 per cent. relative humidity or 3° or 4° C. temperature can cause a difference of 100 per cent. in infection has come as a surprise to many plant pathologists.

Conclusion.

In these few instances, selected from widely different fields, I have tried to show that the problems which face the vegetable pathologist are often akin to those of human pathology. Where there is any evidence that disease processes are fundamentally alike in plants and animals I venture to think that they are worth careful examination by pathologists generally. Their study in plants has many obvious advantages in the ease of experimentation and manipulation. Vegetable pathology is under a great obligation to the older science, from which many of its methods and principles are borrowed, and there could be no more fitting way of repaying this debt than by the discovery that the study of plant diseases may throw light on some of the more obscure problems of human pathology.

LITERATURE FOR MEDICAL MISSIONARIES.

To the Editor of THE LANCET.

SIR,—May I through your columns state a need of which perhaps your readers are not aware? Many qualified members of their profession, working on scant salaries, and scattered over the most lonely parts of the Empire, have no means of getting up-to-date medical literature. Copies of THE LANCET when finished with would be most valuable. As secretary for "Waste Medical Literature" for S.P.G., I will gladly send an address to anyone undertaking to forward the paper. Old literature and papers sent anonymously cannot be forwarded.—I am, Sir, yours faithfully,

(Miss) B. GAMBIER PARRY.

Westhaven, Leckhampton, Cheltenham, Jan. 16th, 1922.

SEMMERING: AN AUSTRIAN HILL SPA.

A RECENT number of the *Wiener Medizinische Wochenschrift* (1921, No. 50) is dedicated to climatic treatment and contains several articles of merit, though nothing strikingly new. Perhaps the most interesting thing is the advertisement on the cover of the health resort Semmering, as well as the frequent references to this place in the text. The former tells us that Semmering is Austria's only hill spa (Höhenkurort), that it is two hours' train journey away from Vienna, stands at 1000 metres (3250 ft.) above sea-level, has winter sports, and that all the doctors are linguists (Sprachenkundig). Cortina has, we believe, moved across the frontier into Italy. In these days when monetary rate of exchange is against us in Switzerland it is worth while to consider what alpine resorts there are in Austria. A really good tuberculosis centre in the highlands of Austria would be invaluable for the patient whose purse does not reach to the high cost of living in Switzerland. Apparently there is none such. Hansy, in his article on indications for mountain cures, definitely states that tuberculosis of the lungs is a contra-indication for Semmering, as the houses are not adapted for isolation and have no means of disinfection. There are institutions for digestive and general illnesses, but no sanatoriums for tubercle. For the patient who wants a mountain health resort for the summer or who is willing to take some risks of finding sufficient snow for winter sports (for it stands at 1000 m., while Mürren stands at 1650 m. and St. Moritz at 1800 m.), Semmering with its advantageous rate of exchange is worth consideration.

COMBINED ASPIRATOR AND TROCAR.

HAVING felt the need for a simple aspirator which would obviate the disadvantages of those now in use, I have, in conjunction with Mr. B. O. W. Cantrell, an engineer, and my colleague, Dr. W. H. Fernando, designed the combined aspirating syringe and trocar shown in the illustration. The combination instrument has no rubber joints to

become perished, and no valves to get out of order; it may be used as a simple syringe for exploring, and it may also be used as a syphon for aspirating. It is convenient to carry, easy to sterilise and to manipulate.

The large "Record" type of syringe, together with trocars and canulæ of various sizes, of which the invention consists, has been made by Messrs. Allen and Hanburys, Wigmore-street, London, W.

H. O. GUNEWARDENE, M.B. Lond.
Baron's Court-road, W.

VOCATIONAL GUIDANCE AND HEALTH.

THE general opinion that greater health and contentment result from congenial than from uncongenial work gives interest to a recent report[1] of the Industrial Fatigue Research Board in which the literature of vocational guidance is admirably reviewed by Mr. B. Muscio. The reader will be astonished at once at the extent of the literature and at the amount of attention which has been directed to the psychological aspect of the subject, while the physical, physiological, and medical aspects have been almost completely neglected. He will also find that but little effort has hitherto been directed at vocational guidance—i.e., at informing anyone for what walk of life he is fitted—although much attention has been paid to vocational selection for special types of work. Each investigator seems to have been trying to satisfy some employer who desired to pick out those likely to be of use for this or that process, and to reject the rest, who are then left to continue on their journey in search of a vocation. The point of view of the applicant for work seems to have been entirely lost sight of; such applicants are interested in finding congenial occupation, and not in being told, after attempting to carry out an extraordinary variety of ingenious tests, that they are not wanted. Even so, great advantage has been gained over the method of engagement by trial and error; and we read that at least in one case "regarding 94 girls who had been given the tests and employment afterwards, the average length of service of those who had been recommended on the test results was 9·56 weeks, while that of those not recommended but nevertheless engaged was 1·05 weeks only."

Promise for the future, however, lies in recognition that the old methods are out of date, and must be replaced as the new science, which is as yet in its infancy, grows to maturity. The tendency to-day is clearly to snatch at results instead of pursuing the laborious task of digging out foundations. Mr. Muscio recognises this and calls for far more systematic and sustained investigation into the capacities required for different occupations, than has hitherto been attempted; in other words, he asks for a national policy of vocational guidance. He points out that the first requirements are knowledge for each occupation of the general intelligence and special capacities required, and of the relation of temperamental qualities to efficiency. Next, information similarly classified could be obtained during the school period from teachers and through medical supervision for transmission to juvenile advisory committees attached to Labour Exchanges. Advantage to health of a scheme of national vocational selection is clear, since occupation is known to be a paramount influence in determining morbidity; the advantage on the material side to productivity is obvious. The first step should be taken by employers who should ascertain and state their requirements; then the supply will be created to meet the demand. In this matter captains of industry owe a duty to the community, and at the same time stand to acquire great financial return.

[1] Vocational Guidance. By B. Muscio. Industrial Fatigue Research Board. 1921. Pp. 57. Price 1*s*.

PUBLIC HEALTH IN GRENADA.

HEALTH conditions in Grenada during 1920 were good. The death-rate, 17·5 per 1000, was the lowest since 1901, in which year the same rate occurred. 43·9 per cent. of the total deaths were of children below the age of 5 years. Intestinal diseases, due to insufficient and improper feeding, are the cause of most of the deaths of children, and remedial measures have been undertaken by the Government and the District Boards. Deducting infantile deaths, the adult death-rate in proportion to the population above 5 years of age becomes reduced to nearly 10 per 1000, and compares favourably with the death-rate in temperate zones. Diarrhœa and enteritis caused 304 deaths (4·0 per 1000 of the population), dysentery 99 (1·3 per 1000), and malaria 77 (1·0 per 1000). The climate can be classed as excellent, especially from December to May, when it is delightful. The trade-winds are steadily prevalent during this period, but occasionally fail in the autumn months, which are sometimes damp and hot. The range of temperature is small, and tends to make the climate equable and healthy. The thermometer seldom reaches 90° F. in the shade or drops below 70°. The average mean temperature is 79°. The rainfall varies according to altitude. In the lowlands of the south the annual amount is as low as 30 inches; in the mountainous centre it approaches 140 inches. At St. George's, midway between the two, the rainfall in 1920 was 68·66 inches, and over the past 29 years the average has been 76·58 inches yearly. Situated in the extreme south of the Caribbean Sea, Grenada is the nearest British island to the mainland of South America, with the exception of Trinidad and Tobago. It is about 21 miles in length and 12 in its greatest breadth; its area is 125 square miles, but including Carriacou, an island to the north, the total area of the colony is 133 square miles. Grenada is mountainous and well watered by streams. Its coast line is rugged, especially on the western coast, and towards the south is deeply indented with bays. St. George's Harbour, land-locked and deep-watered, is one of the most beautiful in the West Indies. The mountain spurs, clothed with forest to their summits, intersect the island into numerous picturesque valleys. There are two small lakes, formed in extinct craters, one called the Grand Etang, near which a sanatorium has been established.

The New Hazell Annual and Almanack for 1922 appears betimes and in convenient compass. It contains all the usual features of reference and is especially valuable for the 30 pages or so dealing with the Civil Service. The list of societies and institutions with their officers has been expanded and is now very comprehensive. Medical users will find acceptable the list of London hospitals on pp. 133 to 137 and of schools of medicine on p. 352. There is a note on medical fees and on the medical benevolent societies. The Annual may be obtained for 5*s*. from Messrs. Henry Frowde and Hodder and Stoughton, 20, Warwick-square, London, E.C. 4.

Willing's Press Guide for 1922, which has just appeared, is the forty-ninth annual issue, and contains as usual an alphabetical list of the newspapers and periodicals issued in the United Kingdom, with the year of establishment, when published, the price, and the publisher's name and address. A classified index follows, which enables the inquirer to find journals under the special headings of medical science, dentistry, mental science, and obstetrics. A useful piece of accurate nomenclature may be mentioned. Journals which appear every two months, or every two weeks, are described as bi-monthly, or bi-weekly, to be distinguished from twice monthly and twice weekly respectively. The volume is obtainable for 2*s*. 6*d*. from James Willing, Ltd., 30, King-street, Covent Garden, London, W.C. 2.

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